

AMENDMENTS
TO
THE WATER QUALITY CONTROL PLAN
FOR THE SAN JOAQUIN BASIN (5C)
FOR
THE CONTROL OF AGRICULTURAL
SUBSURFACE DRAINAGE DISCHARGES

DRAFT REPORT
OCTOBER 1988

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

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SACRAMENTO, CALIFORNIA

TABLE OF CONTENTS

Page

INTRODUCTION	1
BASIN PLAN AMENDMENTS	4
Modifications to Designated Beneficial Uses	4
Modifications to Water Quality Objectives	4
Policies	4
Potential Control Actions	4
Schedule	4
Monitoring and Surveillance	4
Costs and Funding Sources	4
BENEFICIAL USES	12
Surface Water Bodies	12
Beneficial Uses	14
WATER QUALITY OBJECTIVES	19
Existing Water Quality Objectives	19
Additions to Water Quality Objectives	19
POLICIES	30
PROGRAM OF IMPLEMENTATION	34
CONTROL ACTIONS	34
Regional Water Quality Control Board, Central Valley Region	34
State Water Resources Control Board	39
Others	41
SCHEDULE	42
INFORMATION NEEDS	42
Monitoring and Surveillance	43
Studies	45
COSTS	47
FUNDING SOURCES	49
CALIFORNIA ENVIRONMENTAL QUALITY ACT REQUIREMENTS.	51
Environmental Checklist	51
Proposed Activity	59
Determination	60
REFERENCES	61

INTRODUCTION

The State Water Resources Control Board (SWRCB) adopted Order No. WQ 85-1 on 5 February 1985. That order, in part, required that a Technical Committee be formed to look into the regulation of agricultural drainage discharges in the San Joaquin Basin and that the Central Valley Regional Water Quality Control Board (Regional Board) adopt appropriate basin plan amendments and implement a program to regulate agricultural drainage flows in the San Joaquin Basin.

The Technical Committee was charged with the specific tasks of developing: 1) proposed water quality objectives for the San Joaquin River Basin; 2) proposed effluent limitations for agricultural drainage discharges in the basin; and 3) a proposal to regulate these discharges. The Technical Committee has completed its work and issued a report (SWRCB, 1987) that includes recommended water quality objectives and a recommended plan of implementation.

The Regional Board is in the process of amending the Water Quality Control Plan (Basin Plan) for the San Joaquin Basin (5C). Two staff reports on potential basin plan amendments (RWQCB, 1988c and 1988d) have been distributed for comments and been the subject of two workshops. This draft Basin Plan Amendment Report is based on the staff reports, the workshops and the comments received on the staff reports.

The purpose of the Basin Plan Amendment Report is to present the Basin Plan Amendments, and to provide discussion, explanation and rationale. The next section presents that which will be incorporated into the Basin Plan. For the most part it consists of tables and figures. The remaining sections of this report provide the discussion, explanation and rationale for the 1) modifications to beneficial uses, 2) additional water quality objectives, 3) policies, and 4) program of implementation.

This report will be circulated for comment and be the subject of a public hearing before the Regional Board. The report and a notice of public hearing were distributed prior to the public hearing. After the public hearing, the Regional Board will consider adopting the Basin Plan Amendments at a regular Board Meeting.

Background

Figure 1 presents a map of the hydrological features of the San Joaquin Basin. Most of the agricultural subsurface drainage pollutant load developed on the west side of the basin comes from the Panoche Fan area in western Merced and Fresno Counties.

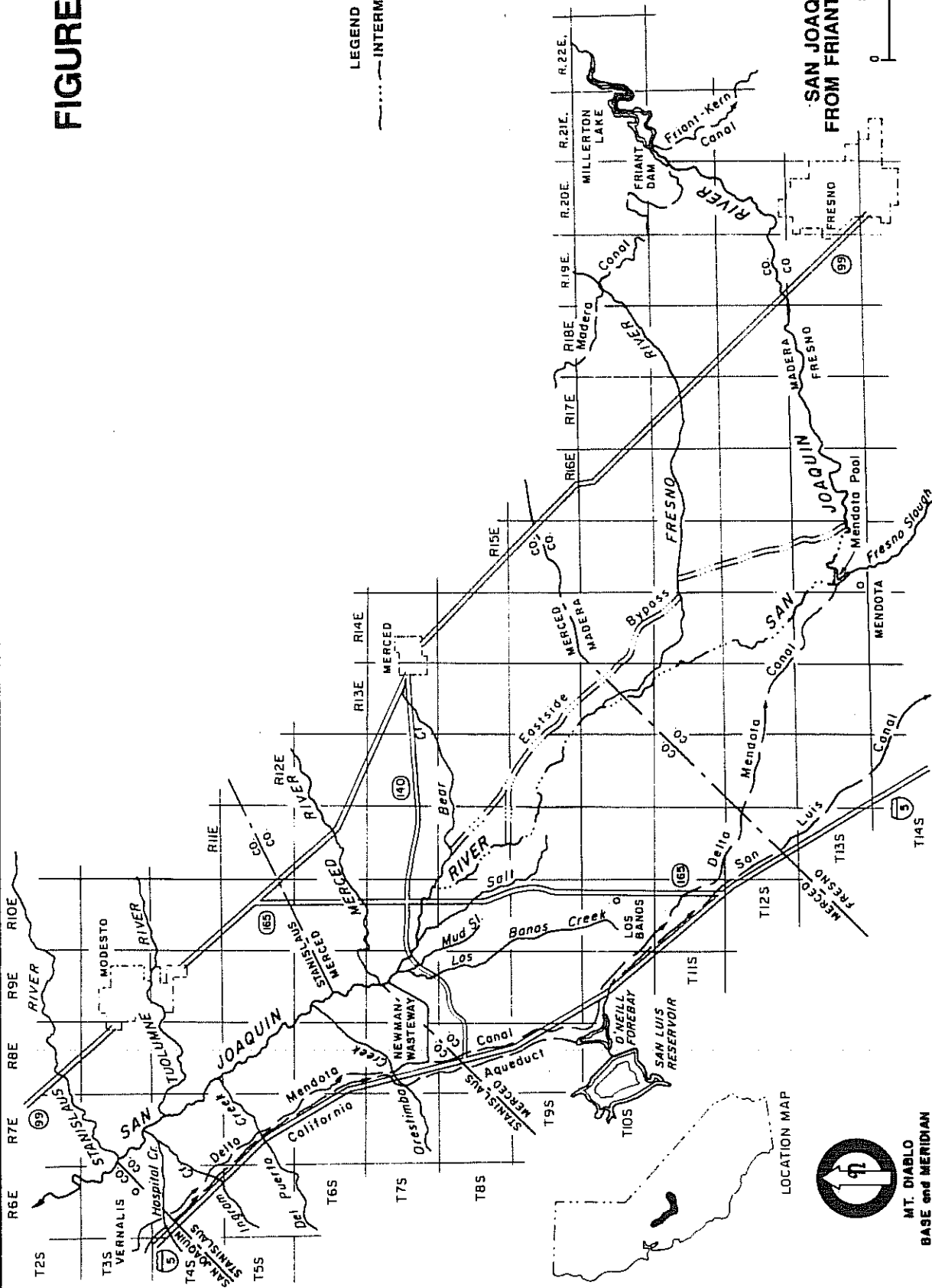
The quality and quantity of the San Joaquin River is strongly influenced by agricultural subsurface drainage discharges. The quality of the river between Mendota Dam and Sack Dam is controlled by the Mendota Pool. During the irrigation season water is released from Mendota Dam and it is diverted at Sack Dam for irrigation. There is little or no flow in the river during the irrigation season between Sack Dam and the mouth of the Merced River except agricultural drainage. The quality of the river from the mouth of Salt Slough and the mouth of Mud Slough (north) to the mouth of the Merced River is

FIGURE 1

LEGEND
 INTERMITTENT

SAN JOAQUIN RIVER BASIN FROM FRIANT DAM TO VERNALIS

SCALE
 0 6 12 Miles



MT. DIABLO
 BASE and MERIDIAN

LOCATION MAP

dominated by the discharges from Salt Slough and Mud Slough (north). The quality of the river is improved by the dilutional flows of the east side tributaries from the mouth of the Merced River to Vernalis. Table 1 summarizes data on the four main constituents of concern in agricultural subsurface drainage for the San Joaquin River, Salt Slough and Mud Slough (north). Additional information on the hydrology and quality of the river can be found in the Technical Committee Report (SWRCB, 1987) and in Regional Board reports (RWQCB, 1988a and 1988b).

Table 1 WATER QUALITY DATA SUMMARY^{1/}

<u>San Joaquin River at Crows Landing^{2/}</u>			
<u>Constituent</u>	<u>Median</u>	<u>Maximum</u>	<u>Minimum</u>
Selenium (ug/l) ^{3/}	3.2	12	<1
Boron (mg/l) ^{3/}	0.84	1.9	0.14
Molybdenum (ug/l) ^{3/}	4	14	<1
Specific Conductance (umhos/cm)	1250	2000	270
<u>Mud Slough (north) at Highway 140</u>			
<u>Constituent</u>	<u>Median</u>	<u>Maximum</u>	<u>Minimum</u>
Selenium (ug/l) ^{3/}	8.0	32	1
Boron (mg/l) ^{3/}	2.8	8.2	0.65
Molybdenum (ug/l) ^{3/}	9.0	22	<5
Specific Conductance (umhos/cm)	2600	6620	1300
<u>Salt Slough at Highway 165</u>			
<u>Constituent</u>	<u>Median</u>	<u>Maximum</u>	<u>Minimum</u>
Selenium (ug/l) ^{3/}	9.5	32	<1
Boron (mg/l) ^{3/}	1.7	3.9	0.43
Molybdenum (ug/l) ^{3/}	7.0	14	4.0
Specific Conductance (umhos/cm)	1910	3700	780

^{1/}From RWQCB (1988a) and RWQCB (1988b) covers period May 1985 through March 1988.

^{2/}Crows Landing is approximately 7 miles downstream of the mouth of the Merced River

^{3/}Conversion Factors

1 ug/l = one part per billion

1 mg/l = one part per million

1 mg/l = 1000 ug/l

BASIN PLAN AMENDMENTS

This report presents the Basin Plan Amendments to be considered for adoption by the Regional Board as part of its program to control agricultural subsurface drainage discharges in the basin. Other sections present the amendments and provide discussion and rationale. This section presents only that which is actually intended to be incorporated into the Basin Plan.

MODIFICATIONS TO DESIGNATED BENEFICIAL USES

The modifications to beneficial uses consist of the identification of two additional surface water bodies, Salt Slough* and Mud Slough (north)*, and designation of their beneficial uses; see Figure 2.

MODIFICATIONS TO WATER QUALITY OBJECTIVES

The modifications to water quality objectives consist of additional objectives for selenium, molybdenum and boron for Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to Vernalis, and selenium for the managed-wetlands water supply channels in the Grassland area. The objectives are summarized in Table 2.

POLICIES

There are six policies regarding the control of agricultural subsurface drainage discharges. They are listed in Table 3.

POTENTIAL CONTROL ACTIONS

The program of implementation contains actions that may be taken to control the discharges of agricultural subsurface drainage in the San Joaquin Basin. These actions are summarized in Table 4.

SCHEDULE

The program of implementation contains a schedule of actions. That schedule is presented in Figure 3.

MONITORING AND SURVEILLANCE

The program of implementation contains a description of the monitoring and surveillance activities to be undertaken by the Regional Board and dischargers. Table 5 lists these activities.

COSTS AND FUNDING SOURCES

The costs of achieving the water quality objectives and potential sources of funding are summarized in Table 6 and Table 7, respectively.

*NOTE: The tributaries of these two sloughs do not necessarily have the same beneficial uses as they do.

PROPOSED BENEFICIAL USES


NOTES:  Proposed existing beneficial use

Table 2 WATER QUALITY OBJECTIVES

Constituent	Water Quality Objectives	
San Joaquin River, mouth of the Merced River to Vernalis		
Selenium	5 ug/l monthly mean	12 ug/l maximum
	8 ug/l monthly mean (critical year only)	
Molybdenum	10 ug/l monthly mean	15 ug/l maximum
Boron	0.8 mg/l monthly mean (15 March through 15 September)	2.0 mg/l maximum
	1.0 mg/l monthly mean (16 September through 14 March)	2.6 mg/l maximum
	1.3 mg/l monthly mean (critical year only)	
Salt Slough, Mud Slough (north), San Joaquin River, Sack Dam to mouth of the Merced River*		
Selenium	10 ug/l monthly mean	26 ug/l maximum
Molybdenum	19 ug/l monthly mean	50 ug/l maximum
Boron	2.0 mg/l monthly mean (15 March through 15 September)	5.8 mg/l maximum
Grassland Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Area (Measured in any water used by subject areas for waterfowl habitat.)		
Selenium	2 ug/l monthly mean	

*An alternate set of objectives is proposed to go into effect, if the plan to use the San Luis Drain is implemented. The alternate set of objectives provide for better water quality in Salt Slough and the San Joaquin River, Sack Dam to the mouth of Mud Slough (north) and a longer compliance period for Mud Slough (north) and the San Joaquin River, mouth of Mud Slough (north) to mouth of the Merced River.

Table 3 POLICIES

-
- I. The control of toxic trace elements in agricultural subsurface drainage, especially selenium, is the first priority.
 - II. Of the two major options for disposal of salts produced by agricultural irrigation, export out of the basin has less potential for environmental impacts and, therefore, is the favored option. The San Joaquin River may continue to be used to remove salts from the basin so long as water quality objectives are met.
 - III. Activities that increase the discharge of poor quality agricultural subsurface drainage are prohibited.
 - IV. The control of agricultural subsurface drainage will be pursued on a regional basis.
 - V. The reuse of agricultural subsurface drainage will be encouraged and actions that would limit or prohibit it discouraged.
 - VI. The valleywide drain to carry the salts generated by agricultural irrigation out of the valley remains the best technical solution to the water quality problems of the San Joaquin River and Tulare Lake Basin.
-

Table 4 POTENTIAL CONTROL ACTIONS

Regional Water Quality Control Board, Central Valley Region

1. Upslope irrigators and water facility operators whose actions contribute to subsurface drainage flows will participate in the program to control discharges.
2. The Regional Board will reconsider water quality objectives for selenium and boron for Mud Slough (north), Salt Slough and the San Joaquin River, Sack Dam to Vernalis and water quality objectives for salinity for the San Joaquin River in 1992.
3. Submittal and approval of drainage operations plans (DOP) will be required from all those discharging or contributing to the generation of agricultural subsurface drainage.
4. Best management practices, principally water conservation measures, are applicable to the control of agricultural subsurface drainage.
5. Waste discharge requirements may be used to control agricultural subsurface drainage discharges containing toxic trace elements, if water quality objectives are not achieved by the compliance dates.

Table 4 (continued)
POTENTIAL CONTROL ACTIONS

6. Milestones to the achievement of water quality objectives for selenium will be used.
7. Public and private managed-wetlands will participate in the program to achieve water quality objectives.
8. Evaporation basins in the San Joaquin Basin will be required to meet minimum design standards, have waste discharge requirements and be part of a regional plan to control agricultural subsurface drainage.
9. The Regional Board staff will prepare a study plan by 1 March 1989 that will identify the information needed to reconsider selenium and boron objectives in 1992.

State Water Resources Control Board

1. As a last resort and where the withholding of irrigation water is the only means of achieving significant improvements in water quality, the Regional Board will consider requesting that the State Water Resources Control Board (SWRCB) use its water rights authority to preclude the supplying of water to specific lands.
2. The SWRCB should require all water agencies in the San Joaquin Basin, regardless of size, to submit an "informational" report on water conservation.
3. The SWRCB should work jointly with the Regional Board in securing compliance with the 2 ug/l selenium objective for managed-wetlands in the Grassland area.
4. The SWRCB should give first priority to the use of the Water Conservation and Water Quality Bond Law of 1986 funds for subsurface drainage pollutant control projects in the San Joaquin Basin, especially in those areas that contribute selenium to the San Joaquin River.
5. The SWRCB should also consider utilizing State Assistance Program Grant funds to implement a cost share program to install a number of flow monitoring stations within the Grassland area to assist in better defining the movement of pollutants through the area.
6. The SWRCB should also consider declaring the drainage problem area in the San Joaquin Basin a priority nonpoint source problem in order to make U.S. Environmental Protection Agency nonpoint source control funding available to the area.

Table 4 (continued)
POTENTIAL CONTROL ACTIONS

Others

1. If fragmentation of the parties that generate, handle and discharge agricultural subsurface drainage jeopardizes the achievement of water quality objectives, the Regional Board will consider petitioning the Legislature for the formation of a regional drainage district.
 2. The Legislature should consider putting additional bond issues before the voters to provide low interest loans for agricultural water conservation and water quality projects and incorporating provisions that would allow recipients to be private landowners, and that would allow irrigation efficiency improvement projects that reduce drainage discharges to be eligible for both water conservation funds and water quality facilities funds.
 3. The San Joaquin Valley Drainage Program should investigate the alternative of a local San Joaquin Basin drain to move the existing discharge point for poor quality agricultural subsurface drainage to a location where its impact on water quality is less. The San Joaquin Valley Drainage Program should also investigate the plan to use the San Luis Drain (the Zahm-Sanson Plan) as the first phase of this alternative.
 4. The USBR should give the districts and growers subject to this program first priority in their water conservation loan program.
-

Table 5 MONITORING AND SURVEILLANCE ACTIVITIES

1. The dischargers will monitor discharge points and receiving waters for constituents of concern and flow (discharge points only).
 2. The Regional Board will continue to monitor the major discharges, tributaries and the San Joaquin River.
 3. The Regional Board will continue its investigations into pollutant transport mechanisms and sinks.
 4. The Regional Board will inspect discharger monitoring and treatment facilities.
 5. The Regional Board, in cooperation with other agencies, will regularly assess water conservation achievements and compile cost and drainage reduction effectiveness information.
-

FIGURE 3

**SCHEDULE OF KEY EVENTS
PROGRAM OF IMPLEMENTATION**

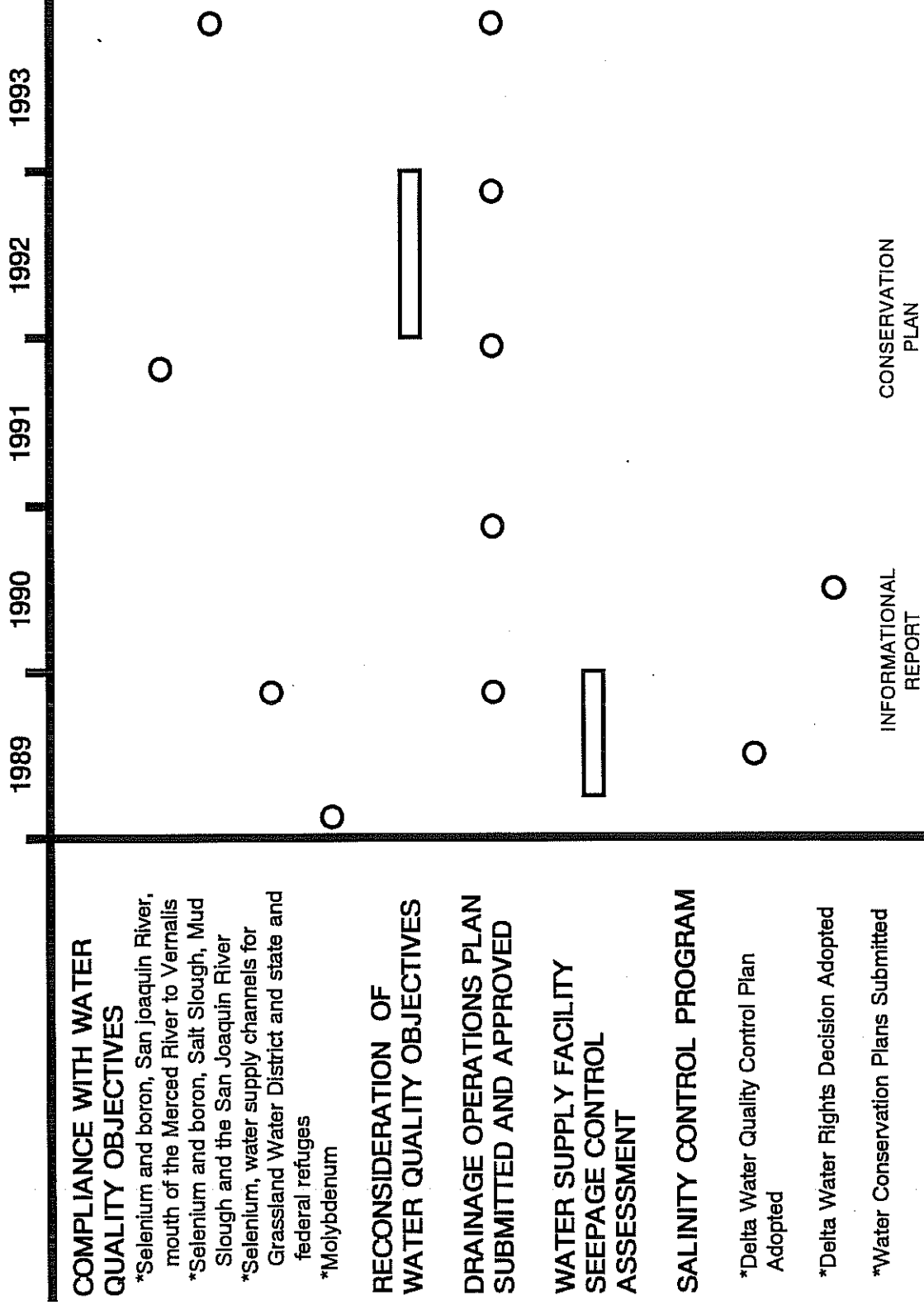


Table 6 COSTS OF ACHIEVING WATER QUALITY OBJECTIVES

Objective	Cost	
5 ug/l selenium, San Joaquin River, mouth of the Merced River to Vernalis	Capital Cost	nil
	O&M Cost	\$16/acre ^{3/} -\$67/acre ^{3/}
	Total Annual Cost	\$16/acre ^{3/} -\$67/acre ^{3/}
10 ug/l selenium, Salt Slough, Mud Slough (north), San Joaquin River, Sack Dam to mouth of the Merced River	Capital Cost	\$20,600,000
	O&M Cost ^{1/}	\$ 450,000
	Total Annual Cost	\$ 1,970,000 or \$21/acre ^{3/}
2 ug/l selenium, Grassland Water District, San Luis National Wildlife Refuge, Los Banos State Wildlife Area	Capital Cost	nil
	O&M Cost ^{2/}	\$8/acre ^{3/}
	Total Annual Cost	\$8/acre ^{3/}

^{1/}Assumes low interest loan at 4% for 20 years to finance capital cost.

^{2/}Based upon mitigation via water supply.

^{3/}Per acre cost based on a 94,480 acre drainage problem area.

Table 7 POTENTIAL FUNDING SOURCES*

1. Private financing by individual sources.
2. Bonded indebtedness or loans from governmental institutions.
3. Surcharge on water deliveries to lands contributing to drainage problems.
4. Ad Valorem tax on lands contributing to the drainage problem.
5. Taxes and fees levied by a district created for the purpose of drainage management.
6. State or federal grants or low-interest loan programs.
7. Single-purpose appropriations from federal or State legislative bodies.

*From the Technical Committee Report (SWRCB, 1987).

BENEFICIAL USES

Beneficial uses are the basis for the regulation of water quality. They formally recognize uses to be protected by regulatory activities. Basin plans identify existing and potential beneficial uses for water bodies. Water bodies are river segments, lakes, reservoirs, etc. The basin plan breaks the surface water system of a basin into surface water bodies and identifies existing and potential beneficial uses for each water body. Not all surface water features are formally identified. Small creeks, streams and sloughs may not be so identified. Rather, as a broad planning tool, the basin plans assume they have the beneficial uses of the water body to which they are tributary until a detailed appraisal can be done.

SURFACE WATER BODIES

The San Joaquin Basin Plan divides the river system in the basin into 28 surface water bodies for the purpose of establishing beneficial uses. The principal parts of the basin river system receiving, conveying or impacted by agricultural subsurface drainage are the San Joaquin River from approximately Lander Avenue to Vernalis and its west side tributaries. The existing surface water bodies identified in the Basin Plan in this reach are:

1. The San Joaquin River, Sack Dam to the mouth of the Merced River.
2. The San Joaquin River, mouth of the Merced River to Vernalis.

There are two west side tributaries, unidentified in the Basin Plan, that are important to the regulation of agricultural subsurface drainage discharges, and that are proposed to be identified as separate water bodies. Salt Slough and Mud Slough (north) are both tributary to the San Joaquin River between Sack Dam and the mouth of the Merced River. They are the major drainage channels for agricultural subsurface drainage from the Panoche Fan area. As indicated in the Technical Committee Report (SWRCB, 1987), these two tributaries contribute the major part of the subsurface drainage pollutant load to the San Joaquin River.

Figure 4 locates Salt Slough and Mud Slough (north). Mud Slough (north) originates at Kesterson Ditch^{1/} and flows generally north to the San Joaquin River. Mud Slough (north) enters the San Joaquin River approximately midway between the mouth of the Merced River and Highway 140 bridge^{2/}. It is fed by a variety of sources including drainage from duck clubs and wildlife refuges, subsurface drainage and tailwater from upslope agriculture, irrigation canal spill water and runoff during the rainy season. The major inflows to Mud Slough (north) are Fremont Canal, Santa Fe Canal, Eagle Ditch and Los Banos Creek.

Salt Slough originates where Salt Slough Ditch and West Delta Drain meet and discharge through Sand Dam^{3/}. Salt Slough flows first northwest and then north to the San Joaquin River. It enters the San Joaquin River about four miles upstream of where Mud Slough (north) enters^{4/}. Salt Slough is fed by a variety of sources including both agricultural tailwater and subsurface drainage, irrigation canal spill water, drainage from duck clubs and wildlife refuges, and runoff during the rainy season. The major tributaries to Salt Slough are Salt Slough Ditch, the Boundary Drain and San Luis Canal via Mud Slough (south).

^{1/}At SW 1/4, NW 1/4, NE 1/4, Sec. 33, T.8S, R.10E, MDB&M

^{2/}At NW 1/4, NE 1/4, NW 1/4, Sec. 14, T.7S, R.9E, MDB&M

^{3/}At SE 1/4, SE 1/4, NE 1/4, Sec. 21, T.9S, R.11E, MDB&M

^{4/}At NE 1/4, NE 1/4, SW 1/4, Sec. 29, T.7S, R.10E, MDB&M

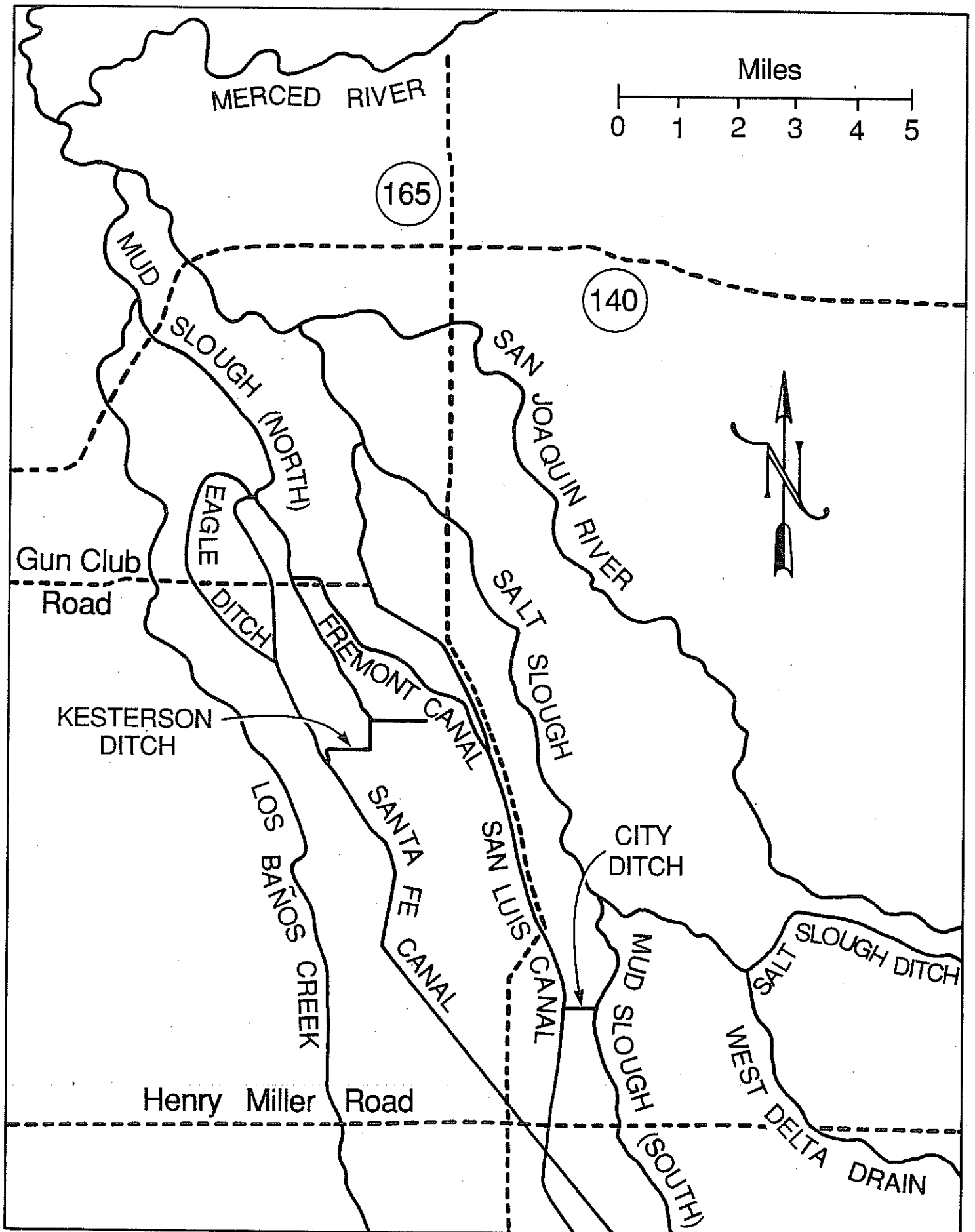


FIGURE 4

As noted earlier, the basin plans assume unidentified tributaries have the beneficial uses of the stream to which they are tributary. For the tributaries of Mud Slough (north) and Salt Slough this is not accurate. Several of the tributaries of Mud Slough (north) and Salt Slough are agricultural drainage channels that do not nor could not support some of the beneficial uses proposed for Mud Slough (north) and Salt Slough. Along with identifying Mud Slough (north) and Salt Slough as separate water bodies, it will be noted that their tributaries do not necessarily have the same beneficial uses as they do.

The Plan to Use the San Luis Drain (also known as the Zahm-Sansoni Plan)

A plan to use the San Luis Drain to carry both fresh water and agricultural subsurface drainage has been proposed. The San Luis Drain would be used to carry fresh water from near Mendota to a point near Highway 152. There the fresh water would be discharged to local canals and agricultural subsurface drainage put into the San Luis Drain. The drainage would be transported to the northern end of the San Luis Drain and discharged to Mud Slough (north) at the northern end of Kesterson Reservoir. The plan would make it easier to bring fresh water into refuges and managed wetlands in the northern Grassland area. It would also remove drainage from all northern Grassland channels and Salt Slough. However, it would also concentrate drainage in Mud Slough (north) from the discharge point to the San Joaquin River. Concentrations of drainage pollutants in this reach of Mud Slough would likely be considerably higher than they have been over the last three years.

BENEFICIAL USES

The Basin Plan identifies the existing and potential beneficial uses of surface waters. The standard beneficial uses defined in the basin plans are presented in Table 8. The standard beneficial uses identified in the Basin Plan for the two surface water bodies of concern here are identified in Figure 5.

Modifications

The purpose of making modifications to the Basin Plan is the regulation of agricultural subsurface drainage discharges in the San Joaquin Basin (5C). The changes in beneficial uses are limited to what is necessary to achieve that objective. The Technical Committee Report (SWRCB, 1987) recommends changes to beneficial uses basin wide and to beneficial uses not directly related to the above objective. Recommended changes not considered here will be considered under the Regional Board's continuing program of basin plan review and update.

The modifications to the identified beneficial uses in the San Joaquin Basin (5C) consist solely of the addition of two water bodies and their beneficial uses. The recommended modifications are summarized in Figure 5 and discussed below.

Beneficial Uses - Salt Slough and Mud Slough (north)

Salt Slough and Mud Slough (north) are similar, especially with respect to beneficial uses, and thus their proposed beneficial uses will be discussed together. Additionally, their proposed beneficial uses were influenced by and will be discussed in terms of the beneficial uses of the reach of the San Joaquin River to which they are tributary (i.e., the tributary reach).

TABLE 8 DEFINITION OF STANDARD BENEFICIAL USES

Designation	Abbreviation	Definition
Municipal and Domestic Supply	MUN	Includes usual uses in community or military water systems and domestic uses from individual water supply systems.
Agricultural Supply	AGR	Includes crop, orchard, and pasture irrigation, stock watering, support of vegetation for range grazing, and all uses in support of farming and ranching operations.
Industrial Service Supply	IND	Includes uses which do not depend primarily on water quality such as mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well re-pressurization.
Industrial Process Supply	PROC	Includes process water supply and all uses related to the manufacturing of products.
Groundwater Recharge	GWR	Includes natural or artificial recharge for future extraction for beneficial uses and to maintain salt balance or halt saltwater intrusion into freshwater aquifers.
Freshwater Replenishment	FRSH	Provides a source of freshwater for replenishment of inland lakes and streams of varying salinities.
Navigation	NAV	Includes commercial and naval shipping.
Hydroelectric Power Generation	POW	Is that supply used for hydropower generation.
Water-Contact Recreation	REC 1	Includes all recreational uses involving actual body contact with water, such as swimming, wading, waterskiing, skindiving, surfing, sport fishing, uses in therapeutic spas, and other uses where ingestion of water is reasonably possible.
Nonwater-Contact Recreation	REC 2	Covers recreational uses which involve the presence of water but do not require contact with water, such as picnicking, sunbathing, hiking, beachcombing, camping, pleasure boating, tidepool and marine life study, hunting, and aesthetic enjoyment in conjunction with the above activities as well as sightseeing.
Warm Freshwater Habitat	WARM	Provides a warmwater habitat to sustain aquatic resources associated with a warmwater environment.
Cold Freshwater Habitat	COLD	Provides a coldwater habitat to sustain aquatic resources associated with a coldwater environment.
Wildlife Habitat	WILD	Provides a water supply and vegetative habitat for the maintenance of wildlife.
Preservation of Rare and Endangered Species	RARE	Provides an aquatic habitat necessary, at least in part, for the survival of certain species established as being rare and endangered species.
Fish Migration	MIGR	Provides a migration route and temporary aquatic environment for anadromous or other fish species.
Fish Spawning	SPWN	Provides a high-quality aquatic habitat especially suitable for fish spawning.

FIGURE 5

PROPOSED AND DESIGNATED BENEFICIAL USES

SURFACE WATER BODIES	MUN	AGRI CULTURE		INDUSTRY			RECREATION		FRESHWATER HABITAT		MIGRATION		SPAWNING		WILD	NAV
		AGR	STOCK WATERING	PROC	IND	POW	REC 1	REC 2	WARM	COLD	WARM	COLD	SPWN			
SAN JOAQUIN RIVER SACK DAM TO MOUTH OF THE MERCED RIVER SALT SLOUGH MUD SLOUGH (NORTH) MOUTH OF THE MERCED RIVER TO VERNALIS		IRRIGATION				CONTACT	CANOEING AND RAFTING	OTHER NONCONTACT	WARM	COLD	WARM	COLD	WARM	COLD		

- NOTES:
- Designated existing beneficial use
 - Designated potential beneficial use
 - Proposed existing beneficial use

Municipal and Domestic Supply The San Joaquin Basin Plan identifies this as a potential beneficial use of the tributary reach of the San Joaquin River; however no designation is proposed for Salt Slough or Mud Slough (north). This has never been an active beneficial use of either Salt Slough or Mud Slough (north). The nearest town, Gustine, is five miles away and uses wells for their water supply. Additionally, the salinities of both sloughs exceed both federal and state standards for drinking water, and water from either would not be considered an esthetically acceptable drinking water supply. The land use around both sloughs is agricultural, wildlife refuge and private duck clubs, and their drinking water and domestic supply comes from wells.

Agricultural Supply The Basin Plan identifies both irrigation and stock watering as beneficial uses of the tributary reach of the San Joaquin River. Both Salt Slough and Mud Slough (north) are used for pasture irrigation and stock watering. Mud Slough (north) is used for limited crop irrigation. Prior to 1985 both Salt Slough and Mud Slough (north) were used to irrigate summer pasture located in duck clubs. Both Agricultural Supply beneficial uses are proposed for Salt Slough and Mud Slough (north).

Industrial Supply The only industrial supply beneficial use identified for any of the reaches of the San Joaquin River considered herein is Process. As with municipal and domestic supply, this has never been an existing beneficial use of either slough. There is no industry or industrial sites located along either slough and the high flooding potential would likely restrict any such development. Lastly, the poor quality of the water in the sloughs would limit the possible industrial uses. No industrial supply beneficial uses are proposed for either Salt Slough or Mud Slough (north).

Recreation The San Joaquin Basin Plan identifies all three types of recreation beneficial uses for the tributary reach of the San Joaquin River. All three types of recreational beneficial uses are proposed for both Mud Slough (north) and Salt Slough. Fishing occurs along both Salt Slough and Mud Slough (north). Boating is limited along the sloughs. Because of a lack of public access and its shallow nature, there is no boating in Mud Slough (north). The upper reach of Salt Slough is similar to Mud Slough (north); the lower reach from Lander Avenue to the San Joaquin River does have some boating. However, recent case law requires the Department of Fish and Game to protect both sloughs for boating. The boating beneficial use should be applied to both sloughs to be consistent. There is no swimming in either slough. There are no public access areas with accommodations for swimmers or bathing along either slough. The water is poor for swimming. However, there are local residents who wade in both sloughs while scavenging for frogs and clams. This activity does represent contact recreation.

Freshwater Habitat The San Joaquin Basin Plan identifies the San Joaquin River from Mendota Pool to Vernalis as having the beneficial use WARM freshwater habitat, but does not identify it as having COLD freshwater habitat. Salt Slough and Mud Slough (north) both should be considered WARM freshwater habitat, because of the presence of warm water fish species. Likewise because of the absence of resident cold water species, they should not be considered COLD freshwater habitat. The beneficial use WARM freshwater habitat is proposed for both sloughs.

Fish Migration The Basin Plan identifies the San Joaquin River from Mendota Dam to Vernalis as both warm and cold water migration. The migration beneficial use is based upon use of a water body by cold or warm water anadromous fish as a migration route and temporary habitat. Warm water anadromous species (striped bass) use both sloughs as a migration route. The warm water migration beneficial use is proposed for both sloughs.

Cold water anadromous species (salmon) also try to migrate through both sloughs. Both sloughs and their tributaries are warm water aquatic habitat. They are often quite turbid with predominantly muddy bottoms. There is essentially no access to cold water habitat up these sloughs. While the use of these sloughs by warm water species could lead to habitat suitable for their survival and/or spawning, such is not the case with cold water species. The use of these sloughs by cold water anadromous species as a migration route is aberrational and is likely due in large part to the presence of Delta water from upslope irrigated agriculture. A better approach to protecting the cold water fish resource would be to reduce the attractiveness of these sloughs to cold water species or to physically remove them to cold water streams or hatcheries, when they appear. The cold water migration beneficial use is not proposed for either slough.

Fish Spawning The San Joaquin Basin Plan identifies the San Joaquin River from the Mendota Dam to Vernalis as having the beneficial use warm water spawning. The San Joaquin Basin Plan also identifies the San Joaquin River from Mendota Dam to the mouth of the Merced River as having the potential beneficial use of cold water spawning. The beneficial use warm water spawning is proposed for both Salt Slough and Mud Slough (north), however cold water spawning is not. The beneficial use cold water spawning is not proposed because of the lack of conditions necessary to support cold water fish spawning. It is not proposed, however, to remove the cold water spawning potential beneficial use from the San Joaquin River, Sack Dam to mouth of the Merced River.

Wildlife Habitat The San Joaquin Basin Plan identifies the San Joaquin River from Mendota Dam to Vernalis as having the beneficial use wildlife habitat. The beneficial use wildlife habitat is proposed for both Salt Slough and Mud slough (north). Both sloughs provide varying extent of riparian habitat. Additionally, both were used as water supplies for wildlife refuges prior to 1985.

WATER QUALITY OBJECTIVES

Water quality objectives are established in basin plans by the Regional Board to reasonably protect beneficial uses. Water quality objectives provide a specific basis for the measurement and maintenance of water quality. The factors considered in establishing water quality objectives include:

1. past, present and probable future beneficial uses;
2. environmental characteristics of the area including existing water quality;
3. achievability; and
4. economic considerations.

The San Joaquin Basin Plan contains water quality objectives for the surface water bodies of concern to this effort. However, few are specific to the control of the major constituents of concern in agricultural subsurface drainage. Additional water quality objectives are needed as a basis for the regulation of agricultural subsurface drainage discharges.

EXISTING WATER QUALITY OBJECTIVES

Table 9 presents the existing water quality objectives applicable to the San Joaquin River between Mendota Dam and Vernalis.

In addition to the specific objectives summarized in Table 9, there is a general objective applicable to the San Joaquin River. State Water Resources Control Board Resolution No. 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California" requires the continuing maintenance of existing water quality. The policy also provides conditions under which a change in water quality is allowable. A change must:

- °Be consistent with maximum benefit to the people of the state.
- °Not unreasonably affect present and anticipated beneficial uses of water.
- °Not result in water quality less than that prescribed in water quality control plans and policies.

ADDITIONS TO WATER QUALITY OBJECTIVES

The principal constituents of concern in agricultural subsurface drainage are selenium, boron, molybdenum and salinity. The most sensitive beneficial uses to these constituents are aquatic life, wildlife and agricultural supply.

Agricultural subsurface drainage contains other trace elements; however, data indicate they are present in less toxic concentrations. This effort focuses on the four main constituents of concern. Efforts to control them and reduce their concentration in surface waters will likely lead to reductions in the other trace elements. If at a later date it becomes apparent that another constituent of agricultural subsurface drainage represents a major water quality problem, consideration will be given to proposing water quality objectives for it.

TABLE 9 WATER QUALITY OBJECTIVES

Constituent	Objective
Bacteria (REC 1)	Concentrations of fecal coliform bacteria in the San Joaquin River, based on a minimum of five samples for any 30-day period, shall not exceed a geometric mean of 200 colonies per 100 ml, nor shall more than 10% of the total number of samples taken during any 30-day period exceed 400 colonies per 100 ml.
Biostimulatory Substances	The San Joaquin River shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.
Chemical Constituents (MUN)	The San Joaquin River shall not contain concentrations of chemical constituents in excess of the limits specified in California Code of Regulations (CCR), Title 22*, and in no instance shall contain chemical constituents in concentrations that adversely affect any beneficial uses. To the extent of any conflict, the more stringent objective applies.
Color	The San Joaquin River shall be free of discoloration that causes nuisance or adversely affects beneficial uses.
Dissolved Oxygen	The monthly median of the daily mean dissolved-oxygen concentration in the San Joaquin River shall not fall below 85% of saturation in the main water mass and the 95 percentile concentration shall not fall below 75% saturation. Dissolved-oxygen concentrations shall not be reduced below the following minimum levels at any time: °Reaches designated as warm-water habitat (WARM) 5.0 mg/l °Reaches designated for warm- or cold-water spawning 7.0 mg/l (SPWN)
Floating Material	The San Joaquin River shall not contain floating material in amounts that cause nuisance or adversely affect beneficial uses.
Oil and Grease	The San Joaquin River shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.
pH	The pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in reaches of the River designated as cold- or warm-water habitats (COLD or WARM).
Pesticides	No individual pesticide or combination of pesticides shall be present in the San Joaquin River in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life that adversely affects beneficial uses. Total identifiable chlorinated hydrocarbon pesticides shall not be present at concentrations detectable within the accuracy of analytical methods prescribed in Standard Methods for the Examination of Water and Wastewater, latest edition, or other equivalent methods approved by the Executive Officer of the Central Valley Regional Board.
	The San Joaquin River reaches designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the limiting concentrations set forth in CCR, Title 22*.

*Cited as "California Administrative Code, Title 17, Chapter 5, Subchapter 1, Group 1, Article 4 Section 7019, Tables 2, 3, and 4" in the 1975 edition of the San Joaquin Basin Plan.

TABLE 9 WATER QUALITY OBJECTIVES (Continued)

Constituent	Objective
Radioactivity	Radionuclides shall not be present in the San Joaquin River in concentrations that are deleterious to human, plant, animal or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, or aquatic life. Reaches designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the limits specified in CCR, Title 22*.
Salinity	In the San Joaquin River near Vernalis, the mean average TDS concentration shall not exceed 500 mg/l over any consecutive 30-day period.
Sediment	The suspended sediment load and suspended sediment discharge rate of the San Joaquin River shall not be altered in such a manner as to cause a nuisance or adversely affect beneficial uses.
Settleable Material	The San Joaquin River shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.
Suspended Material	The San Joaquin River shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Tastes and Odors	The San Joaquin River shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin or that cause nuisance, or otherwise adversely affect beneficial uses.
Temperature	The natural receiving water temperature of the San Joaquin River water shall not be altered unless it can be demonstrated to the satisfaction of the Central Valley Water Quality Control Board that such alteration in temperature does not adversely affect beneficial uses. At no time or place shall the temperature of the San Joaquin River be increased more than 5°F above natural receiving water temperature.
Toxicity	The San Joaquin River shall be maintained free of toxic substances in concentrations that are toxic to or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the Central Valley Regional Water Quality Control Board. The survival of aquatic life in the San Joaquin River subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or, when necessary, for other control water that is consistent with the requirements for "experimental water" as described in Standard Methods for the Examination of Water and Wastewater, latest edition. At minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay.
Turbidity	The San Joaquin River shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits: <p>^aWhere natural turbidity is between 0 and 50 Jackson Turbidity Units (JTU), increases shall not exceed 20%. ^bWhere natural turbidity is between 50 and 100 JTU, increases shall not exceed 10 JTU. ^cWhere natural turbidity is greater than 100 JTU, increases shall not exceed 10%.</p>

*Cited as "California Administrative Code, Title 17, Chapter 5, Subchapter 1, Group 1, Article 4 Section 7019, Tables 2, 3, and 4" in the 1975 edition of the San Joaquin Basin Plan.

The Technical Committee Report (SWRCB, 1987) recommended water quality objectives for the four main constituents of concern in agricultural subsurface drainage. The Committee's recommended water quality objectives are presented in Table 10.

Water Quality Objectives for Selenium

San Joaquin River, Mouth of the Merced River to Vernalis The selenium water quality objectives, and compliance date and point are as follows:

- o 5 ug/l monthly mean.
- o 8 ug/l monthly mean, critical water year only*.
- o 12 ug/l maximum.
- o Measured at Crows Landing.
- o Based on weekly sampling.
- o Compliance to be achieved by October 1991.

The monthly mean objective is the same as the interim objective recommended in the Technical Committee Report (SWRCB, 1987). The maximum objective is lower and is based on existing water quality. They are proposed for reasons similar to those given in the Technical Committee Report (SWRCB, 1987):

1. The objectives provide reasonable protection to beneficial uses based on present knowledge.
2. The objectives are reasonably economically and technically achievable by the compliance date.
3. There is some evidence suggesting the level protective of waterfowl may be lower; however, there are on-going efforts to provide additional information on levels protective of waterfowl, and the present waterfowl uses of this reach of the river are limited.
4. The Regional Board will reconsider selenium objectives for this reach of the San Joaquin River in 1992.
5. The objectives are in agreement with the fresh water aquatic life criteria promulgated by EPA (EPA, 1987).

*Critical water year for the San Joaquin Basin as defined in the Water Quality Control Plan for the San Joaquin Basin (5C).

Table 10

TECHNICAL COMMITTEE REPORT (SWRCB, 1987)
RECOMMENDED WATER QUALITY OBJECTIVES

LOCATION	CONSTITUENT	MAXIMUM MEAN MONTHLY LEVEL	INSTAN- TANEOUS MAXIMUM	COMPLIANCE DATE
<u>Interim Objectives</u>				
San Joaquin River at Hills Ferry and downstream	Selenium	5 ppb	26 ppb	October 1991
Grassland WD, San Luis NWR and Los Banos SWA	Selenium	2 ppb (can be provided via a substitute supply) <u>1/</u>		October 1989
<u>Long-term Objectives</u>				
San Joaquin River at Hills Ferry and downstream	Selenium	to be determined based on site- specific data		To be determined
	EC	1.0 mmho		
	Boron	700 ppb	5800 ppb	
	Molybdenum	10 ppb	440 ppb	
Salt & Mud Sloughs & San Joaquin River Lander Ave. to Hills Ferry	Selenium	10 ppb	26 ppb	To be determined
Salt Slough and San Joaquin River Lander Ave. to Hills Ferry	EC	3.0 mmho		To be determined
	Boron	2,000 ppb	5,800 ppb	
	Molybdenum	10 ppb	440 ppb	
Grassland WD San Luis NWR and Los Banos SWA	Selenium	To be determined based on site- specific data (can be provided via a substitute supply) <u>1/</u>		To be determined

1/ If a substitute supply of 2 ppb or lower is provided, the quantity of this supply should be in a volume equal to the lesser of either (1) the quantity of water (mid-1970s) diverted by these waterfowl areas or (2) the actual flow in the canals available to these areas.

Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to the Mouth of the Merced River The selenium water quality objectives, and compliance dates and points are as follows:

- o 10 ug/l monthly mean.
- o 26 ug/l maximum.
- o Measured at Highway 165 on Salt Slough and at the footbridge north of Kesterson Reservoir on Mud Slough (north).
- o Based on weekly sampling.
- o Compliance to be achieved by October 1993.

These objectives are the same as the long-term objectives recommended in the Technical Committee Report (SWRCB, 1987). They are proposed for reasons similar to those given in the Technical Committee Report (SWRCB, 1987):

1. The objectives are reasonably economically and technically achievable by the compliance date. The objectives will, in part, be achieved by those efforts necessary to achieve the selenium objective proposed for the San Joaquin River, mouth of the Merced River to Vernalis.
2. It is not certain what selenium level is protective of the aquatic life in the sloughs. Present data indicate that these objectives may reasonably protect instream fishery resources. There is on-going work that will provide additional information on the impacts of present and future levels of selenium on instream aquatic resources.
3. There is another more restrictive objective for waterfowl areas.
4. The Regional Board will reconsider selenium objectives for these water bodies in 1992.

Grassland Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Area These areas are not separately identified water bodies. Thus, the water quality in the channels around and through these areas is controlled by compliance with objectives in Mud Slough (north) and Salt Slough. With regards to selenium, this situation is not reasonably protective of the waterfowl using these areas. The separate selenium water quality objective, and compliance date and point are as follows:

- o 2 ug/l monthly mean.
- o Measured in any water supplies used by subject areas for waterfowl habitat.
- o Based on weekly sampling during any period when water is applied to waterfowl areas.
- o Compliance to be achieved by October 1989.

This objective is the same as the interim objective recommended in the Technical Committee Report (SWRCB, 1987). It was proposed for reasons similar to those given in the Technical Committee Report (SWRCB, 1987):

1. Evidence suggests that the selenium level for protection of waterfowl habitat water supply may be lower than 5 ug/l.
2. The subject areas are principally used as managed waterfowl habitat.
3. The objective is protective of the beneficial use and the waterfowl resource in the Central Valley.
4. The objective is specific to the water supply for waterfowl areas. It only applies to the channels around and through the subject areas when they are being used to supply water to waterfowl habitat. Otherwise the proposed objectives in Mud Slough (north) and Salt Slough control the water quality in these channels.
5. This objective can be achieved technically and economically. However, there are a variety of means by which it may be met. The technical and economic reasonableness of achieving it strongly depends upon the means chosen.
6. The Regional Board will reconsider selenium objectives for these areas in 1992.

Water Quality Objectives for Boron

San Joaquin River, Mouth of the Merced River to Vernalis. The water quality objectives, and compliance date and point are as follows:

- o 0.8 mg/l monthly mean, 15 March through 15 September.
- o 1.0 mg/l monthly mean, 16 September through 14 March.
- o 1.3 mg/l monthly mean, critical water year only*.
- o 2.0 mg/l maximum, 15 March through 15 September.
- o 2.6 mg/l maximum, 16 September through 14 March.
- o Measured at Crows Landing.
- o Based on weekly sampling.
- o Compliance to be achieved by October 1991.

*Critical water year for the San Joaquin Basin as defined in the Water Quality Control Plan for the San Joaquin Basin (5C).

The monthly mean objective for the irrigation season (15 March through 15 September) is slightly higher than that recommended in the Technical Committee Report (SWRCB, 1987) and the maximum is lower. The monthly mean objective for the nonirrigation season is higher than that recommended in the Technical Committee Report (SWRCB, 1987) and the maximum is lower. The above objectives were proposed for the following reasons:

1. One of the beneficial uses impacted by boron is agricultural irrigation supply. While a few crops may require levels lower than 0.8 mg/l to be fully protected, the crops on which water from this reach of the San Joaquin River is presently used appear to show no boron toxicity damage. Since the monthly mean objective for the irrigation season is based on existing boron levels, it should reasonably protect the beneficial use of agricultural irrigation supply.
2. The other beneficial use potentially impacted by boron is aquatic life. The Technical Committee Report (SWRCB, 1987) indicates a level of 0.76 mg/l is protective of all aquatic life. The final version of the criteria development report (SWRCB, 1988) proposes 0.55 mg/l as protective of all aquatic life. This reach of the river, however, has the aquatic life beneficial uses of warm water aquatic life, warm water spawning, and cold and warm water migration. Examination of the data upon which these criteria were developed shows that cold water aquatic life spawning (Rainbow Trout embryo/larva) is the most sensitive life stage and species by almost a factor of 10. Considering that cold water aquatic life or cold water spawning are not beneficial uses of this reach of the river, the objective should be reasonably protective of existing aquatic life beneficial uses.
3. The maximum objectives are lower than that recommended by the Technical Committee Report (SWRCB, 1987). They are based on existing water quality.
4. The objectives are reasonably achievable with the efforts needed to meet the selenium objective for this reach.

Salt Slough, Mud Slough (north), and the San Joaquin River, Sack Dam to the Mouth of the Merced River. The water quality objectives and compliance date and point are as follows:

- o 2.0 mg/l monthly mean, 15 March through 15 September.
- o 5.8 mg/l maximum
- o Measured at Highway 165 on Salt Slough and at the footbridge just north of Kesterson Reservoir on Mud Slough (north).
- o Based on weekly sampling.
- o Compliance to be achieved by October 1993.

The Technical Committee Report (SWRCB, 1987) recommended a long-term monthly mean objective for the San Joaquin River, Sack Dam to the mouth of the Merced River only. The seasonal monthly mean objective provides reasonable protection

for the existing agricultural irrigation beneficial use by controlling boron levels during the period of use, i.e., the irrigation season. During the nonirrigation season, mean boron levels will be controlled by the boron objective in the San Joaquin River, mouth of the Merced River to Vernalis. The maximum objective is the same as that recommended by the Technical Committee Report (SWRCB, 1987). The above objectives were proposed for the following reasons:

1. Warm water aquatic life is more tolerant of boron than is indicated by the criterion in either SWRCB (1987) or SWRCB (1988), and the proposed objectives provide protection to instream fishery resources from peak concentrations.
2. The crops grown in the area are boron tolerant. The monthly mean objective provides reasonable protection to the agricultural beneficial use.
3. The Regional Board will reconsider boron objectives for these waters in 1992.

The Plan to Use the San Luis Drain (the Zahm-Sansoni Plan)

This plan provides considerable water quality benefits by removing agricultural subsurface drainage from the interior channels of northern Grassland, Salt Slough and the reach of the San Joaquin River, Sack Dam to the mouth of Mud Slough (north). However, there are concerns about the impacts of the increased levels of the constituents in agricultural subsurface drainage on Mud Slough (north). The Regional Board believes the plan has sufficient merit to consider alternate set of water quality objectives for Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to the mouth of the Merced River. These objectives are meant to do the following:

1. Provide an institutional basis for the proponents of the plan to pursue its implementation, if they wish.
2. To realize the improvements in the water quality of Salt Slough and the reach of the river.
3. Provide time for studies to be completed to determine the appropriate water quality objectives for Mud Slough (north).

The alternative water quality objectives are for selenium and boron and would be implemented at initiation of operation of the plan. The alternative objectives are as follows:

Mud Slough (north) and the San Joaquin River, the Mouth of Mud Slough (north) to the Mouth of the Merced River. The proposed water quality objectives and compliance point are the same as the original. The compliance date is moved back to 1995.

Salt Slough and the San Joaquin River, Sack Dam to the Mouth of Mud Slough (north). The proposed water quality objectives and compliance date and point are as follows:

Selenium

- o 5.0 ug/l monthly mean
- o 12 ug/l maximum

Boron

- o 1.0 mg/l monthly mean
- o 2.6 mg/l maximum
- o Measured at Highway 165 on Salt Slough
- o Based on weekly sampling
- o Compliance to be achieved within six months of initiation of operations of the discharge.

Study of Impacts. In addition to the alternate objectives, a study of Mud Slough (north) to mouth of the Merced River will be done. The purpose of the study would be to determine the impacts of the discharge and to provide information on which to base site-specific water quality objectives.

Water Quality Objectives for Molybdenum

San Joaquin River, Mouth of the Merced River to Vernalis The objectives and compliance date and point are as follows:

- o 10 ug/l monthly mean.
- o 15 ug/l maximum.
- o Measured at Crows Landing.
- o Compliance to be achieved immediately upon adoption.

The monthly mean objective is the same as that recommended by the Technical Committee Report (SWRCB, 1987). The maximum objective is more restrictive. The above objectives were proposed for the following reasons:

1. The Technical Committee Report (SWRCB, 1987) recommended a monthly mean objective of 10 ug/l based on the criterion for agricultural irrigation supply that was developed in 1972 from a limited data base. A review by Pratt (1988) has recommended revision of the agricultural irrigation supply criterion to 50 ug/l. Thus the objectives would be protective of the agricultural supply beneficial use.
2. The Technical Committee Report (SWRCB, 1987) indicates that the aquatic life criterion should be 44 ug/l as a mean. The final version of the criteria development report (SWRCB, 1988) proposes a lower concentration, 19 ug/l as a mean, as the criterion protective of all aquatic life. The proposed monthly mean objective is considerably lower than both. Thus, the objective should be protective of the aquatic life beneficial uses.

3. Monitoring indicates that the levels of molybdenum in the water bodies of concern are much lower than the published criteria. The monthly mean objective and maximum objective are based on existing water quality and the Nondegradation Policy.

San Joaquin River, Sack Dam to Mouth of the Merced River, Salt Slough and Mud Slough (north) The objectives and compliance date and point are as follows:

- o 19 ug/l monthly mean.
- o 50 ug/l maximum.
- o Measured at the footbridge just north of Kesterson Reservoir on Mud Slough (north) and Highway 165 on Salt Slough.
- o Compliance to be achieved immediately upon adoption.

The above objectives were proposed for the following reasons:

1. The Technical Committee Report (SWRCB, 1987) recommended a monthly mean objective of 10 ug/l based on the criterion for agricultural irrigation supply that was developed in 1972 from a limited data base. A review by Pratt (1988) has recommended a revision of the agricultural irrigation supply criterion to 50 ug/l. Thus, the maximum objective would be protective of the agricultural supply beneficial use.
2. The Technical Committee Report (SWRCB, 1987) indicates that the aquatic life criterion should be 44 ug/l. The final version of the criteria development report (SWRCB, 1988) proposes a lower concentration, 19 ug/l as a mean, as the criterion protective of all aquatic life. The objectives should be protective of the aquatic life beneficial uses as they are based on the recommended criterion for aquatic life.

Water Quality Objectives for Salinity

No water quality objectives were proposed for the four water bodies of concern for salinity for the following reasons:

1. The salinity in the San Joaquin River is a resource management problem involving agricultural economics. The salinity in the sloughs and river is not a problem for aquatic life nor for public health. Rather it is a parameter in the agricultural economics of semi-arid areas.
2. The present salinity levels are close (slightly higher) to the objectives recommended by the Technical Committee Report.
3. Efforts required to meet proposed selenium objectives will likely reduce salinity levels.
4. There is an existing salinity objective at Vernalis for the Delta.
5. When the salinity objective at Vernalis is revised, the Regional Board will develop a program of implementation for it.
6. The Regional Board will reconsider the need for salinity objectives for the San Joaquin River upstream of Vernalis in 1992.

POLICIES

The policies in this section are proposed for adoption by the Regional Board into the San Joaquin Basin Plan. As part of the Basin Plan they are the official guidance of the Regional Board for its programs. In addition, other agencies are expected to implement these policies in their programs. The policies in this section are part of the institutional basis of the program to control agricultural subsurface drainage discharges and provide direction to staff and other agencies.

I. The control of toxic trace elements in agricultural subsurface drainage, especially selenium, is the first priority.

This policy establishes that priority be given to the control of selenium. Specifically, efforts to control selenium should be given first priority in the allocation of resources, that portion of the program to control selenium will be more intensive, and dischargers will be expected to accept greater burdens to improve water quality. Emphasis for selenium control will be directed at discharges entering the San Joaquin River from the west side upstream of the Merced River.

The toxic trace elements in agricultural subsurface drainage, especially selenium, represent the most immediate threat to wildlife and aquatic life resources. In some instances the toxic trace elements may represent a threat to public health; on the other hand, the major impact of salinity is not immediate and may be solely economic in nature. Additionally, there are other significant salinity sources in the basin besides agricultural subsurface drainage and factors other than discharges that are important in its control. Thus, while the control of all constituents for which there are water quality objectives is important, the threat to wildlife and aquatic life resources by the toxic trace elements is judged to be of significantly greater importance to the public, and deserving of the higher priority.

II. Of the two major options for disposal of salts resulting from agricultural irrigation, export out of the basin has less potential for environmental impacts and, therefore, is the favored option. The San Joaquin River may continue to be used to remove these salts from the basin so long as water quality objectives are met.

The San Joaquin River for over two decades has been used as the outlet for salt discharges from the subsurface drainage generated in the western portion of the basin. The Regional Board in its 1975 Basin Plan recognized that this salt load would increasingly have an impact on the San Joaquin River and that by 1990 beneficial uses would be seriously impaired.

The greatest increase in salt load since 1970 has come from the Federal Central Valley Project Service Area with the newly implemented San Luis Unit as the most significant contributor. It was known prior to project implementation that the San Luis Unit would significantly increase the generation of subsurface drainage. Therefore, as part of the project, Congress authorized construction of the San Luis Drain to export the salt from the basin. The Regional Board recognized the importance of this facility in its Basin Plan by a policy of supporting its construction. The basis for this policy was the need to reverse the degradation of the San Joaquin River. In addition, once the drain was completed, the Regional Board envisioned that water quality objectives in the San Joaquin River would be adopted and effluent limits imposed to achieve these objectives. The detailed studies are now complete and the drain has not been constructed.

The San Joaquin River has thus become a substitute for the San Luis Drain. Continued uncontrolled discharges from the Federal Central Valley Project water customers is passing salt management problems and costs to downstream water users as well as potentially impacting aquatic resources in the river. The impacts of these salinity discharges are being exacerbated by the diversions upstream and other water use in the river basin. The Central Valley Project and especially the San Luis Unit must carry a major responsibility for the present degradation in the river caused by nonimplementation of a valley-wide drainage facility.

In order to maintain viability in the San Joaquin Basin, irrigated agriculture must have a means of disposing of salts. The major feasible near-term alternatives appear to be to locally isolate the salts in the basin or to continue to export the salts out of the basin. There are major potential environmental impacts on ground water and wildlife resources associated with the most prominent technology used to isolate salts in basin (evaporation basins). However, the quality of the San Joaquin River is important and should not be sacrificed. For the present, the San Joaquin River may be used to export salts from the basin, provided levels of toxic trace elements are controlled and water quality objectives are met.

III. The valleywide drain to carry the salts generated by agricultural irrigation out of the valley remains the best technical solution to the water quality problems of the San Joaquin River and Tulare Lake Basin.

The disposal of salts generated by irrigation is paramount to the continued viability of agriculture in the San Joaquin Valley (i.e., the San Joaquin Basin and the Tulare Lake Basin). Present disposal practices of these salts is causing water quality problems for the San Joaquin River and in the Tulare Lake Basin. As stated above (Policy II) the Regional Board recognized these problems would occur and supported construction of a valleywide drain in the Basin Plan as a means of relieving them. The Basin Plan also provides that water quality objectives and waste discharge requirements would be adopted for the discharge from the valleywide drain.

This policy reaffirms the Regional Board's position that a valleywide drain is needed and is the best technical solution to the water quality problems being caused by the generation of these salts and present disposal practices. Its completion should be pursued by the U.S. Bureau of Reclamation (USBR) and California Department of Water Resources (DWR).

The water quality problem of concern here is the degradation of the San Joaquin River. A logical first phase of a valleywide drain would be a San Joaquin Basin local drain to keep poor quality agricultural subsurface drainage out of high quality surface waters.

IV. Activities that increase the discharge of poor quality agricultural subsurface drainage are prohibited.

The installation of new subsurface drainage facilities or the expansion of existing facilities can exacerbate the water quality problems due to discharges of agricultural subsurface drainage. The installation of new subsurface drainage facilities* or the expansion of existing facilities* in areas where the drainage produced has an average selenium concentration greater than 20.0 ug/l is prohibited. The installation of new subsurface drainage facilities or expansion of existing facilities in areas where the drainage produced has an average selenium concentration greater than 5 ug/l and less than or equal to 20 ug/l is prohibited unless the grower and landowner have a water conservation and management plan approved by both the local drainage or irrigation district and Regional Board Executive Officer for the area to be served by the drainage facilities. The Regional Board will consider granting a variance to the prohibition in areas where drainage selenium concentrations are greater than 20 ug/l provided that: 1) the grower and landowner have a water conservation and management plan approved by both the local drainage or irrigation district and the Regional Board Executive Officer and 2) that they can demonstrate that other drainage reduction actions will be taken by the owner or grower concurrently with the installation of new drainage facilities such that there is a net decrease in the selenium mass load discharged in agricultural subsurface drainage. The Regional Board will consider rescinding the prohibition when selenium water quality objectives are met.

*For the purposes of the implementation program, subsurface drainage facilities will include tile drainage systems, drainage wells, and any deep open drains that intercept ground water.

V. The control of agricultural subsurface drainage will be pursued on a regional basis.

In many cases drainage facilities are collecting and discharging subsurface drainage in excess of that generated by the land being irrigated immediately overlying the subsurface drains. Subsurface drainage is generated by irrigation water or seepage that passes to the ground water table. Land under irrigation or water supply facilities hydrogeologically upgradient of subsurface drain facilities most likely contribute to the volume and pollutant load discharged by those facilities.

The control of agricultural subsurface drainage may be accomplished by both point source and nonpoint source methodologies. Agricultural subsurface drainage discharges may be treated or stored at the sites of the drainage facilities as though they were point sources. However, the generation of subsurface drainage can only be controlled by nonpoint source control measures such as improved water distribution and use practices.

Responsibility for subsurface drainage discharges surely lies with all those generating it as well as with those with drainage facilities. More importantly, those who generate may be able to control it more easily than those who just discharge it. Agricultural subsurface drainage discharges thus are a regional problem and a regional approach will most efficiently and fairly provide a solution.

VI. The reuse of agricultural subsurface drainage will be encouraged and actions that would limit or prohibit it discouraged.

The optimal use of available water supplies in the San Joaquin Basin should be the goal of all public and private interests in the basin. Highly saline water can be used for intermittent periods for various beneficial uses including agricultural irrigation. Such use should be encouraged, especially in areas known to have poor quality ground water or extensive ground water overdrafts.

In addition, reuse by blending currently takes place in much of the agricultural subsurface drainage problem area. This blending and reuse should be encouraged, provided it does not aggravate the existing toxic trace element problem.

PROGRAM OF IMPLEMENTATION

Water Code Section 13242 prescribes the minimum contents of the program of implementation: a description of the nature of the actions which are necessary to achieve the water quality objectives, a time schedule, and a monitoring and surveillance program. In addition, Water Code Section 13141 requires that prior to implementation of any agricultural water quality control program, an estimate of the total cost of such a program and identification of sources of funding be indicated in the Basin Plan. This section presents the program of implementation consisting of the minimum contents listed above, the required cost and funding source information, and a section on needed studies (information needs).

CONTROL ACTIONS

This section describes the nature of the actions that may be used in implementing the Regional Board's program to control agricultural subsurface drainage discharges in the San Joaquin Basin. These control actions are directed at both toxic trace elements (e.g., selenium) and boron and salinity. Some control actions require implementation by agencies or institutional bodies other than the Regional Board.

REGIONAL WATER QUALITY CONTROL BOARD, CENTRAL VALLEY REGION

The Responsibility of Upslope Contributors

On the west side of the San Joaquin Basin, lands under irrigation that lie hydrogeologically upslope of lands with subsurface drainage facilities contribute to drainage volumes and pollutant loads produced by the drainage facilities and share the responsibility associated with the discharges from these facilities. The USBR, DWR, and local water agencies by virtue of their ownership and operation of water supply and ancillary facilities on the west side of the San Joaquin Basin are responsible for the production of subsurface drainage. Additionally, the USBR by introducing additional out-of-basin irrigation water supplies (the San Luis Unit of the Central Valley Project (CVP)) into the west side of the San Joaquin Basin without provision of facilities to remove drainage share responsibility with the irrigators for the subsurface drainage discharges to surface waters.

Recent studies from the U.S. Geological Survey and others show that the majority of the selenium is coming from ground water below the level of subsurface drainage facilities. Thus upslope irrigators or water supply facilities may not affect peak flows and selenium loads, but do contribute to "base flows" and the high regional ground water table. Because the hydrogeology in the area is heterogeneous, quantifying upslope contributions may not be practical or possible.

The Regional Board in its program for the control of agricultural subsurface drainage discharges will require upslope irrigators and local water agencies to submit drainage operations plans and will include them in monitoring and reporting programs, and will require upslope irrigators to participate in drainage reduction activities and other planning and reporting efforts necessary to achieve water quality objectives. The Regional Board may also require the USBR, DWR, and local water agencies to perform studies, to prepare reports and to participate in drainage reduction activities necessary to achieve water quality objectives.

Review of Water Quality Objectives

The Regional Board will reconsider water quality objectives for selenium and boron for Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to Vernalis and salinity objectives for the San Joaquin River in 1992. During the implementation period of the Regional Board's program, environmental, water quality and economic studies are proposed. Much new information should be generated about the appropriateness of the adopted water quality objectives, their achievability and the economic impacts of achieving them. In 1992, the Regional Board will repeat the Basin Plan amendment process used here. In doing so, boron and selenium objectives will be reviewed in the light of the new information and adjusted, if necessary. On the basis of the results of the SWRCB Delta Hearings, salinity objectives for the San Joaquin River will be considered. The program of implementation will also be reviewed and adjusted.

As a result of the environmental impacts from selenium and other trace elements seen at Kesterson Reservoir, the SWRCB saw an urgent need for the control of agricultural subsurface drainage discharges and adopted Order WQ 85-1 setting a very stringent time schedule for the development and adoption of beneficial uses and water quality objectives and implementation of a regulatory program.

The SWRCB Order WQ 85-1 Technical Committee and the Regional Board staff relied upon existing information to develop recommended beneficial uses and water quality objectives and this implementation program. However, existing information in several crucial areas, including safe levels of selenium and boron for fish and wildlife, the efficiency of methods for controlling the discharges of trace elements in agricultural subsurface drainage, and the economic impacts of regulating agricultural discharges, was sparse and additional information was just starting to be developed.

Reconsidering water quality objectives and the regulatory program three years after their adoption, provides the opportunity to adjust them based on the new information developed in the intervening years. The results of many multi-year technical studies should be available. Site specific information on the impacts of selenium and boron on fish and wildlife at or near potential water quality objectives needs to be available. Information on the effectiveness of drainage control methods needs to be available, and the economic impacts of regulation needs to be much better defined. If the additional information is available, it will allow refinement of water quality objectives and the implementation program.

The SWRCB Delta Hearings are a major undertaking, involving much effort and several years. The products of the Delta Hearings will provide a great deal of new information about water quality needs in terms of salinity. The Regional Board will use this information to develop a plan of implementation for salinity. Additionally, in 1992, the Regional Board will use it as a base for reconsidering salinity objectives for the San Joaquin River.

The normal process for reviewing basin plans is the triennial review. Triennial reviews of the San Joaquin Basin Plan would occur in 1990, 1993, etc. Review of these amendments and other related issues subsequent to 1992 would occur as part of the triennial review, that being in 1996.

Drainage Operations Plan

The Drainage Operations Plan (DOP) will be the central control mechanism used by the Regional Board. The DOP is a coordinated set of activities (that could include BMPs, drainage treatment, or drainage storage) that will be undertaken to reduce drainage pollutant discharges to meet water quality objectives. Initially, they will be requested of those that generate or discharge agricultural subsurface drainage containing toxic trace elements in western Merced and Fresno Counties. However, their use may be expanded to other areas. They will be submitted and approved on an annual basis, and will analyze the achievement or nonachievement of the preceeding year's milestones and water quality objectives. They will also propose a plan based on the experience of the previous year(s) to meet the coming year's milestones or water quality objectives. They will be submitted to and approved by the Regional Board Executive Officer.

Best Management Practices

BMPs are applicable to the control of agricultural subsurface drainage discharges. The generation of subsurface drainage occurs over wide areas, i.e., sources are dispersed, and the application of control technologies to irrigation or to conveyance facilities should be successful at reducing drainage discharges. Some potential BMPs are:

- o increased irrigation uniformity through installation of more efficient irrigation equipment;
- o more efficient preirrigation;
- o better managed initial irrigation;
- o use of high ground water in the summer to meet crop water requirements; and
- o reduction of seepage from head ditches and unlined irrigation canals.

No one method of reducing excess deep percolation is likely to be best in all areas and for all crops. A mixture of BMPs is likely to be most effective. This mixture of technologies is best formulated at the local level, and the DOP serves as the mechanism by which site specific plans may be developed and coordinated into regional efforts.

Additionally, flexibility in the use of BMPs is needed. The effectiveness of specific BMPs on subsurface drainage reduction is not well known. Local conditions beyond the control of farmers may also impact the effectiveness of certain BMPs. BMPs may need to be changed, combined or used simultaneously. This flexibility is also provided for in the DOP.

Waste Discharge Requirements

The Regional Board may use WDRs to control the toxic trace elements in the discharges of agricultural subsurface drainage from western Merced and Fresno Counties, and may extend their use elsewhere as necessary. However, they will only be considered, if the use of DOPs and BMPs fails to achieve compliance with water quality objectives in the specified time frames.

Milestones to Achievement of Water Quality Objectives

The following milestones will be used to assess progress towards meeting the selenium water quality objectives in the San Joaquin River, Salt Slough, and Mud Slough (north).

<u>Time Period</u>	<u>Maximum Monthly Mean Selenium Concentrations</u>	
	<u>San Joaquin River Mouth of the Merced River to Vernalis</u>	<u>Salt Slough, Mud Slough (north), and the San Joaquin River, Sack Dam to mouth of the Merced River</u>
WY 90 (10/89-9/90)	Dry Year* 6 ug/l	
	Critical Year* 9 ug/l	20 ug/l
WY 91 (10/90-9/91)	Dry Year* 5 ug/l	
	Critical Year* 8 ug/l	17 ug/l
WY 92 (10/91-9/92)	Dry Year* 5 ug/l	
	Critical Year* 8 ug/l	15 ug/l

*Type of water year as defined in "Water Quality Control Plan for the San Joaquin Basin (5C)", 1975

Regulation of Public and Private Managed-Wetlands

The managed wetlands in Grassland Water District, the San Luis National Wildlife Refuge, the Kesterson National Wildlife Refuge, and Los Banos State Wildlife Management Area all discharge to the channels within the Grassland area. They contribute to the load of pollutants discharged to surface waters both by their discharges and by the generation of subsurface drainage by their water use. However, it is likely their net contribution of pollutants is small.

The public and private wetlands must participate in the program to control discharges of agricultural subsurface drainage. At the very least, they will be required to more intensively monitor the quality and volume of water they receive and discharge. They should be required to develop water conservation plans by the SWRCB. They may also need to alter their management practices as part of the region-wide program to meet water quality objectives. In addition, water use in the Grassland area contributes directly to the salinity concentrations in the San Joaquin River. These salinity contributions and their time of discharge will need to be considered in any salinity management plan developed for the San Joaquin River.

Evaporation Basins

There are few evaporation basins used for agricultural subsurface drainage disposal in the San Joaquin Basin. Control of agricultural subsurface drainage discharges may expand interest in evaporation ponds. In general, the following will govern the Regional Board's consideration of permits for new evaporation basins in the San Joaquin Basin:

1. a formal Report of Waste Discharge (RWD) will be required;
2. discharge and disposal will be regulated by issuance of WDRs;
3. a monitoring program will also be required;
4. the design and operation of the ponds will be subject to the same requirements as those in the Tulare Lake Basin;
5. evaporation basins will only be permitted in areas with existing subsurface drainage facilities and poor ground water quality;
6. evaporation basins will only be permitted as part of a regional plan to control agricultural subsurface drainage; and
7. existing evaporation basins will be considered in DOPs and taken out of use and closed, if no longer needed.

Study Plan

The Regional Board staff will develop a study plan to provide the information needed to reassess the selenium and boron objectives in 1992. The study plan will be developed in cooperation with and with the input of other agencies with planned or ongoing studies that would likely contribute needed information. The study plan will provide basic information: a brief description of each study, costs, timing and potential participants. The study plan will be completed by 1 March 1989 and submitted to the Regional Board for approval.

STATE WATER RESOURCES CONTROL BOARD

Water Rights Authority

The discharge of agricultural subsurface drainage is a direct result of irrigation. The application of water in excess of crop needs and the seepage from irrigation ditches, canals and reservoirs upgradient of subsurface drainage facilities generates deep percolation and potentially drainage. Thus, it is logical to look at controls on irrigation supplies in drainage problem areas to control agricultural subsurface drainage discharges.

Under extraordinary circumstances, the Regional Board may request that the SWRCB withdraw permission for water use for specific lands. In cases where dischargers have shown no progress towards reducing agricultural subsurface drainage discharges, Regional Board procedures have been exhausted, the dischargers continue to contribute significant pollutant loads to surface waters and the Regional Board feels that the withholding of irrigation water is the only means of achieving significant improvements in water quality, the Regional Board will request that the SWRCB make a finding of waste and unreasonable use of water and use whatever administrative remedies available to exclude the application of water on the offending lands.

Water Conservation Plans

In concert with a basin-wide salinity management effort, water conservation plans may be required of irrigation districts or other water purveyors. These plans should be required of all water purveyors in the San Joaquin Basin including those with subsurface drainage responsibilities and those who export water from the basin. The goal of the water conservation plans would be to identify where water could be saved and evaluate these savings in terms of the load of salinity discharged to the river.

Water conservation plans should be prepared by all agricultural water distribution agencies. At present, AB 1658 requires all water agencies that distribute greater than 50,000 acre-feet of water to prepare an informational report and if determined that water savings can be achieved, a full water conservation plan should be prepared. The informational report is due to DWR by December 1989 with the full water conservation plan due by December 1991. The timing of these submittals is adequate for purposes of developing a basin-wide salinity management plan; however, all agricultural water agencies in the San Joaquin River Basin should be requested to prepare the informational report regardless of the amount of agricultural water distributed. This request should be initiated through the existing statutes that permit the SWRCB to review any factors needed to determine the adequacy of existing water right permits.

Selenium Water Quality Objective for Waterfowl Areas

The purpose of this objective is the protection of the off-stream beneficial use of seasonal-wetland-maintenance for waterfowl. The objective can be achieved in one or a combination of three ways:

1. reduction of selenium levels in discharges to the channels through the Grassland area;
2. bypassing of drainage with high selenium levels around the Grassland area; and
3. provision of a water supply of appropriate quality to wetlands areas.

The interests and responsibilities for achieving this water quality objective are complex. A system of water distribution, management, and exchanges has developed over several decades in the Grassland area. The only option available to the Regional Board to implement the selenium objective would require the control of all discharges to the Grassland area channels including those from agricultural areas, State and federal water projects, wetlands and refuges, municipalities and any others using these channels. This would not be an effective method because of the number of discharges, lack of any regularity in the discharges and the complexity of the channels in the area.

The control of the water quality in these channels is best accomplished by local agencies. If options #1 or #2 above were implemented, the Regional Board would provide adequate overview. The third option would require the participation of the SWRCB as it involves water appropriation and may best be regulated through the water right process.

Financing of BMPs and Other Control Measures

Many of the BMPs and other control measures that could be used to reduce agricultural subsurface drainage flows or reduce loads of pollutants discharged require capital investment in facilities or equipment. The availability of funds will be important to the success of the Regional Board's implementation program.

Low interest loans are available to public entities under the Agricultural Drainage Water Management Loan Program or the Water Conservation Loan Program as mandated by the Water Conservation and Water Quality Bond Law of 1986 (Proposition 44). The SWRCB should give a priority to use of Proposition 44 funds for drainage pollutant control activities within the San Joaquin River Basin, especially those areas contributing significant selenium concentrations to the San Joaquin River through the Grassland Basin. These areas would include all drainage systems from the alluvial fan and a portion of the drains in the basin rim deposits as defined by the U.S. Geological Survey.

Additional funding through the State Assistance Program (SAP) could be made available for activities in the drainage reduction program. At present, funding from the SAP is being utilized to initiate several large-scale pilot test programs in the drainage problem area aimed at drain flow reduction. In addition, the SAP funding was used to cost share water conservation practices in western Stanislaus County. The SWRCB should also consider utilizing SAP Grant funding to implement a cost share program to install a number of flow monitoring stations within the Grassland Basin to assist in better defining loads passing through that area.

The SWRCB should also consider declaring the drainage problem in the San Joaquin River Basin as one of the priority nonpoint source problems in their state-wide assessment issued to EPA annually. Nonpoint source funding for implementation of control measures could then be made available to responsible public entities who can administer these funds for on-field improvements. This funding source is likely to be available for several years and this time frame coincides with a likely time period for implementation to take place. These funds should be administered with efforts in implementing the DOPs.

OTHERS

Regional Drainage District

The formation of a regional drainage district has many benefits. Such a district could help their member farming operations develop and implement environmentally acceptable solutions to their drainage problems and could assist in apportionment of responsibility and costs. Additionally, a regionally developed drainage reduction program would provide greater flexibility in achieving water quality objectives. Such a regional program would also likely be less costly than the sum of individual programs. The Regional Board would also benefit by dealing with a single entity in implementing its regulatory program.

The discharges of agricultural subsurface drainage in the San Joaquin Basin are a regional problem and are most effectively addressed at the regional level. As long as the parties involved with the problem cooperate among themselves and with the Regional Board in achieving water quality objectives, there is no need for a formal regional drainage district. However, if fragmentation of the parties that generate, handle, and discharge agricultural subsurface drainage jeopardizes the achievement of water quality objectives, the Regional Board will consider actively petitioning the Legislature for the formation of a regional drainage district in the area.

Any regional drainage district formed should be given priority over local drainage districts and other local agencies dealing with agricultural drainage. Such authority is necessary and warranted because of the greater impact of the actions of such a district and the need for regional control. Additionally, the regional drainage district should be given priority in receiving grants and loans.

San Joaquin Basin Drain

A potential alternative for improving San Joaquin River water quality is the construction of a local drain to segregate agricultural subsurface drainage from higher quality surface waters. The USBR as part of the San Joaquin Valley Drainage Program should investigate the option of constructing a local San Joaquin Basin drain that would collect westside poor quality agricultural subsurface drainage and transport it north to a point where its discharge to the river would have a lesser impact on water quality than present discharges.

The San Joaquin Valley Drainage Program should incorporate the plan to use the San Luis Drain (known as the Zahm-Sansoni Plan) into its planning efforts as a subalternative to the above alternative. The plan to use the San Luis Drain should be investigated as the first phase of the alternative to construct a San Joaquin Basin drain.

Financing of BMPs and Other Control Measures

In addition to the actions indicated above for the SWRCB, two others are also important.

The Water Conservation and Water Quality Bond Law of 1986 (Proposition 44) made low interest loans available to public entities for agricultural water conservation or wastewater facilities. These funds are essentially all obligated at this time. The Legislature should consider, on a regular basis, putting similar bond issues before the voters. Some important modifications should be made. Because many of the BMPs require the purchase of equipment by the growers, funds from such bond issues should also be available to private parties. Additionally, irrigation efficiency improvements that lead to both water conservation and drainage reduction should be eligible as both water conservation facilities and water quality facilities.

The USBR has a program to provide low interest water conservation loans to CVP contractors. The USBR should do all in its power to give the districts and growers subject to this program first priority in their loan program.

SCHEDULE

A schedule of the key events for the Regional Board's program to control agricultural subsurface drainage discharges is presented in Figure 3. Some of the events listed are not under the direct control of the Regional Board, e.g., adoption of the Delta Water Quality Control Plan for salinity and the Delta Water Rights Decision.

There are many more events and deadlines associated with the Regional Board's program. They are, in general, not included because it is not possible to accurately estimate deadlines and/or flexibility is needed in the timing of their initiation or completion. The deadlines listed, other than those for the Delta Water Quality Control Plan and Water Rights Decision, represent a commitment on the part of the Regional Board to do all that is reasonable and within their jurisdiction for their achievement.

INFORMATION NEEDS

This section includes the monitoring and surveillance programs of the Regional Board and dischargers, and the studies needed to effectively implement the regulatory program and achieve water quality objectives.

MONITORING AND SURVEILLANCE

Monitoring and surveillance includes monitoring done by the dischargers, monitoring and investigations done by the Regional Board and surveillance and inspections done by the Regional Board.

Discharger Monitoring

Most of the dischargers of agricultural subsurface drainage on the west side of the San Joaquin basin are already monitoring their discharges under Regional Board Monitoring and Reporting Programs and have since 1985. Some dischargers were monitoring on their own prior to 1985. The discharger monitoring required as part of the implementation program will be a continuance of existing monitoring with modifications to make it specific to the new water quality objectives and other needs of the implementation program.

In general, the monitoring programs for the Grassland area drainers will be as follows:

- o Monitoring sites
 - discharge points
 - receiving water points
- o Monitoring frequency
 - weekly; Se, B, Mo & EC
 - quarterly; other trace elements
- o Constituents
 - Flow, Se, B, Mo, EC & other trace elements and minerals as previous monitoring indicates

In general, monitoring programs operated by the local agencies (dischargers) have had a local focus. Local level monitoring has included drainage sumps, internal drains, discharge points and limited receiving waters. The emphasis on local monitoring will continue to ensure that a reliable database is developed from which management decisions can be made. One weakness in the present discharger monitoring program is the lack of reliable flow data and flow monitoring stations. The SWRCB should consider developing a cost share program to facilitate the construction of a reliable network of flow monitoring stations at key discharge points and at several key management points within the drainage channels. The outflow monitoring points from the Grassland area are of sufficient accuracy that no additional effort is needed. Development of reliable area-wide monitoring stations would enable better accounting of loads being generated on an area-wide basis.

In addition to the traditional monitoring of discharges and receiving waters, irrigation, drainage and water district managers will be requested to work with Regional Board staff in compiling information on the efforts made to reduce the generation of subsurface drainage. In cooperation, the managers and Regional Board staff will compile information on irrigation efficiency improvements, both management and equipment, and on seepage control improvements. The information will include:

- o types of systems employed;
- o types of management techniques employed;
- o effectiveness of reducing deep percolation;
- o resulting subsurface drainage reduction; and
- o costs.

Regional Board Monitoring

The Regional Board as part of its nonpoint source impact analysis has on a regular basis been monitoring discharges of agricultural subsurface drainage, tributaries and the San Joaquin River for the constituents in agricultural subsurface drainage. The Regional Board with the cooperation of local agencies has conducted synoptic sampling of subsurface drainage facilities discharges (tile drain sumps) on several occasions. In addition, the Regional Board has done a number of investigations to locate and define sources of toxic trace elements associated with agricultural wastewater discharges, the concentration and location of subsurface drainage toxic trace elements in surface waters, and the methods of transport and sinks of agricultural subsurface drainage constituents.

Much of this monitoring will continue. The Regional Board will continue to monitor the major discharges of agricultural subsurface drainage, tributaries carrying agricultural subsurface drainage and the San Joaquin River on a regular basis. In addition, the investigations into the transport mechanisms and sinks of the toxic trace elements in agricultural subsurface drainage will continue. High priority will be given to investigating the apparent loss (sink) of selenium in the Grassland area channels including Mud Slough (north) and Salt Slough. This level of monitoring and investigation will continue until the discharges of agricultural subsurface drainage are under satisfactory control.

Regional Board Surveillance and Inspection

Regional Board surveillance and inspection activities will include the following:

1. The Regional Board will inspect discharge flow monitoring facilities and will continue its cooperative effort with dischargers to ensure the quality of laboratory results of sampling.
2. The Regional Board will, on a regular basis, inspect any facilities constructed to store or treat agricultural subsurface drainage.
3. The Regional Board will continue to maintain and update its information on agricultural subsurface drainage facilities in the San Joaquin basin. Efforts at collecting basic data on all facilities, including flow estimates and water quality will continue.

4. As water conservation is likely to play an important part in efforts to meet water quality objectives, the Regional Board, in cooperation with other agencies, will on a regular basis assess water conservation achievements. Since water conservation is closely tied to other practices that are implemented at the farm level, the Regional Board may consider establishment of a Water Quality Task Force for the San Joaquin River Basin to advise the Regional Board in water management progress. The task force will represent a cross section of industry, agency and environmental interests who will assess the progress made in load reductions by water conservation and provide input to the local agencies and the Board on changes in future DOPs. In addition, in cooperation with the programs of other agencies and local district managers, the Regional Board will gather information on irrigation practices, i.e., irrigation efficiency, and on seepage losses, i.e., types, numbers, and length of canals, ditches, etc., use of facilities, and typical seepage rates.

STUDIES

In 1985, little was known about the location and concentrations of selenium, molybdenum and other trace elements and toxics that occur in subsurface agricultural drainage water. In a short period of three years, we have gained a great deal of insight. Our knowledge, however, does not allow us to feel confident that a system of load reductions by water conservation or other BMP will meet water quality objectives. Nor is the information adequate to agree that the proposed water quality objectives are fully protective of the designated beneficial uses.

There are a number of urgent informational needs. Information is needed to refine water quality objectives and the Regional Board's regulatory program. Information about means of achieving water quality objectives and complying with the requirements of the Regional Board's implementation program is also needed. In addition, the information about practical means of reducing drainage flows needs to be transferred to the farmer level.

A number of efforts should be undertaken to meet these needs. These include the following:

1. Development of a regional ground water model. The drainage problem in the Grassland Basin of the San Joaquin River Basin is a shallow ground water management issue. The impact of certain practices are not fully understood. There is a need to complete development of a regional ground water model. Initial efforts on a Regional Ground Water Model have been started by the U.S. Geological Survey for the entire San Luis Service Area but a higher priority in funding needs to be directed at developing a more intensive model for the area which presently discharges through the Grassland area.
2. An assessment of the efficacy and the cost of actions taken by dischargers to meet the water quality objectives over the next three years. Preliminary cost information was developed by the San Joaquin River Technical Committee. These costs were refined by the University of California Committee of Consultants. Their costs, however, like the Technical Committee's projections were based on a series of assumptions. Validation of assumptions and additional refinement of cost accuracy is needed.

3. Site-specific data on the impact of trace elements in subsurface agricultural drainage is lacking and must be available prior to the review of the proposed water quality objectives and regulatory plan. The areas of most immediate need are:
 - a. An assessment of the existing condition of the fish, biota and food chain items in the San Joaquin River and Mud and Salt Sloughs.
 - b. A determination of the impacts of changes in water quality on the fish, biota, and food chain items in the San Joaquin River and Mud and Salt Sloughs.
4. Development of drainage reduction technology and transfer to the farmer level. The biggest unknown in utilizing water management to implement load reduction are whether or not the available technology will work, how effective this technology is and which parts of that technology are best developed and implemented in the drainage problem area. These are most effectively answered using a multi-disciplined effort to develop information about drainage reduction technology and transfer this to the farm level. Several existing mechanisms are available for development of the technology (USDA, ARS, UC System Coop Extension and private efforts) and its transfer (UC Coop Extension, USDA, SCS, local water agencies and private efforts). The role of the Regional Board should be to encourage and support these efforts.
5. Studies of regional in basin solutions to the discharge of agricultural subsurface drainage. Regional in-basin storage of salt and other in-basin solutions need to be studied to determine their risk as compared to the risks or cost associated with continued use of the San Joaquin River as an outlet. The Regional Board should provide support to agencies attempting to find grant funds for these studies and as available, allocate resources to determine whether these solutions are applicable in the basin and whether interim sites should be tested.
6. Load monitoring studies to establish effectiveness of control measures for toxic trace elements and salinity and boron. These studies should focus on establishing cause-and-effect relationships.
7. Studies to identify the impact of upslope contributions to subsurface drainage facilities. While the exact quantification of volumes and pollutant loads from individual upslope irrigators is not possible at this time, basic information, i.e., estimates of volume and impact of quality, about the collective impact of upslope irrigation on specific facilities can be obtained. Additionally, it may be possible to use information obtained from intensive studies at several sites to develop a model that would allow extension to other sites.

COSTS

The task of developing of accurate information about the costs of achieving water quality objectives has been very difficult. At the start of the Technical Committee's work, not only was little known about the cost of potential actions to control the discharge of toxic pollutant loads in agricultural subsurface drainage, but more significantly, little was known about many of the potential control actions themselves. The Technical Committee not only developed technical information about potential control actions, but also developed information on the costs of those potential control actions, the costs of achieving a variety of water quality objectives and identified the most likely type of control action to be used initially (water conservation) (SWRCB, 1987). Subsequent to the Technical Committee work, the University of California Committee of Consultants and others published reports about water conservation techniques, providing additional specific information about capabilities, and in some cases better basis information upon which to develop costs.

There is still uncertainty as to what the costs of achieving water quality objectives will actually be. There is no doubt that present estimates are as good as can be done with present knowledge. However, because of a lack of information about the effectiveness of the variety of water conservation techniques at reducing subsurface drainage flows under actual field conditions and about which techniques will actually be employed, it is unlikely significant improvements in accuracy can be made for some time, i.e., until some field experience is gained.

This section summarizes the information available on cost estimates for achieving the selenium objectives in the San Joaquin River, Salt Slough, Mud Slough (north) and the managed-wetlands area.

The Technical Committee Report

The Technical Committee hired consultants to prepare a report on the economic impacts of controlling agricultural subsurface drainage discharges. The consultants undertook a number of tasks including developing cost information on a number of traditional treatment schemes for reducing agricultural subsurface drainage pollutant loads, developing a model of the economy in the area subject to regulations and estimating the economic impacts of meeting a variety of potential water quality objectives. Additionally, in the course of their work, the consultants found that water conservation was a highly favored alternative.

The Technical Committee Report (SWRCB, 1987) presents information on the costs of achieving various potential water quality objectives and the economic impacts of achieving those water quality objectives. Included among those were the three selenium water quality objectives in this report for 1) the San Joaquin River, mouth of the Merced River to Vernalis, 2) Salt Slough, Mud Slough (north) and San Joaquin River, Sack Dam to mouth of the Merced River, and 3) Grassland Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Management Area.

San Joaquin River, Mouth of the Merced River to Vernalis

The proposed selenium water quality objective for this reach of the river is 5 ug/l monthly mean. The Technical Committee Report (SWRCB, 1987) concluded that drainage flow reduction was that least costly method of achieving this objective. In part, this conclusion was based on estimates of the existing average deep percolation in the area contributing to agricultural subsurface drainage discharges, the extent to which that could be reduced by water conservation measures, and, in turn, the extent to which drainage discharges could be reduced. The costs to achieve this selenium objective were estimated by the Technical Committee as follows:

Capital Cost	\$ 0
O&M Cost	\$1,510,000 or \$16/acre
Total Annual Cost	\$1,510,000 or \$16/acre

The O&M cost is a net cost. It represents the costs to improve existing irrigation practices, minus savings for pumping costs. Additionally, the O&M cost is based on the assumption that the required deep percolation reduction could be produced by improving existing practices without having to convert to new technology systems. However, the net O&M cost does not include credit for the cost of the actual water saved. The per acre cost is calculated assuming a 94,480 acre drainage problem area.

The University of California, Committee of Consultants, published two reports on irrigation efficiency improvement; "Opportunities for Drainage Water Reduction", (UC, 1988a) and "Associated Costs of Drainage Water Reduction", (UC, 1988b). The first report reported that the drainage reduction assumed by the Technical Committee in estimating costs would lead to an 8% yield reduction in cotton if irrigation uniformity were not improved. The report concluded "there are opportunities to reduce drainage volumes by better management of existing irrigation systems...", and "the 6-inch drainage discharge is marginally achievable by furrow irrigation and requires best management of existing systems." The second report indicates that achievement of the drainage flow reduction assumed by the Technical Committee would impose a cost on the farmer "less than \$25 per acre." The results of the second report were based on a computer model of farming assuming optimization of profits. Thus any yield loss was incorporated into the cost.

McGahan (1988) in commenting on a Staff Report (RWQCB, 1988c) calculated the cost of the yield loss cited in the UC report (UC, 1988a). He estimated the cost at \$67 per acre per year.

A study funded by the Department of Water Resources for the Westside Resource Conservation District investigated water conservation and drainage reduction (Burt and Katen, 1988) at the field level. The study area included lands in the drainage problem area and lands to its south. Two results are important here. First, the average deep percolation found (9.7 inches) was very close to that estimated by the Technical Committee (9 inches) and, second, that approximately one-third of the fields investigated had deep percolation of 12 inches or greater and three fields had deep percolation in excess of 21 inches. These results appear to indicate that the use of good water management practices by those that presently employ poor practices could lead to significant drainage flow reductions.

As indicated earlier, estimating the costs of achieving water quality objectives is difficult. Based on present information, it appears the cost of achieving the selenium objective (5 ug/l) in the San Joaquin River, mouth of the Merced River to Vernalis, is most likely between \$20 per acre per year and \$67 per acre per year. However, there are indications it could be lower or higher.

Salt Slough, Mud Slough (north) and San Joaquin River, Sack Dam to Mouth of the Merced River

The proposed selenium water quality objective for these channels is 10 ug/l monthly mean. The Technical Committee Report (SWRCB, 1987) concluded that the least cost methods for achieving this objective involved singly or in combination the regulation of subsurface drainage flows to reduce peaks, treatment to remove some selenium or a channel discharging to the San Joaquin River below the mouth of the Merced River. The costs estimated by the Technical Committee are as follows:

Capital Costs	\$20,600,000
O&M Costs	\$ 450,000
Total Annual Costs*	\$ 1,970,000 or \$21 per acre

*Assumes annualization of capital costs at 4% over 20 years.

Grassland Water District, San Luis National Wildlife Refuge, Los Banos State Wildlife Management Area

The selenium water quality objective for these areas is 2 ug/l in their water supply channels when they are receiving water for the managed-wetlands. There are three options for meeting this objective: 1) reduce concentrations in drainage discharged to the channels in these areas; 2) bypass the drainage around these areas; or 3) provide a substitute water supply. Hall (1988) estimated the cost of achieving this objective via the third option. His estimate was \$8 per acre per year.

FUNDING SOURCES

The Technical Committee investigated sources of funding and identified seven general types in their report (SWRCB, 1987). The list of potential funding sources is presented in Table 11. Note that a number of these sources may have restrictions, involving what the funds may be used for or the type of recipient.

Table 11 POTENTIAL FUNDING SOURCES*

1. Private financing by individual sources.
 2. Bonded indebtedness or loans from governmental institutions.
 3. Surcharge on water deliveries to lands contributing to drainage problems.
 4. Ad Valorem tax on lands contributing to the drainage problem.
 5. Taxes and fees levied by a district created for the purpose of drainage management.
 6. State or federal grants or low-interest loan programs.
 7. Single-purpose appropriations from federal or State legislative bodies.
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*From SWRCB, 1987

CALIFORNIA ENVIRONMENTAL QUALITY ACT REQUIREMENTS

The basin planning process has been certified as "functionally equivalent" to the preparation of the Environmental Impact Report (EIR) for the purposes of complying with the California Environmental Quality Act (CEQA) (Section 15251, Title 14, California Code of Regulations (CCR)). Based on this certification, the Basin Plan Amendment Report itself is used in lieu of an EIR.

Any regulatory programs of the Regional Board certified as functionally equivalent, however, must satisfy the documentation requirements of Section 3777(a), Title 23, CCR. This section satisfies part a. of that section. It contains the following:

1. An Environmental Checklist
2. A Description of the Proposed Activity
3. A Determination with Respect to Significant Environmental Impacts.

ENVIRONMENTAL CHECKLIST

I. Background

The California Regional Water Quality Control Board, Central Valley Region, will consider amending the Water Quality Control Plan for the San Joaquin Basin (5C) by modifying the identified beneficial uses, adding water quality objectives and including an implementation program to control agricultural subsurface drainage discharges in the San Joaquin Basin. The main body of this report (the Basin Plan Amendment Report) describes the amendments under consideration. Questions or comments regarding this checklist should be directed to Regional Board staff at 3443 Routier Road, Sacramento, CA 95827, or via phone, (916) 361-5600.

II. Environmental Impacts

(Explanations of all "yes" and "maybe" answers are provided in the following section.)

	<u>Yes</u>	<u>Maybe</u>	<u>No</u>
1. Earth. Will the proposal result in:			
a. Unstable earth conditions or in changes in geologic substructures?	___	___	<u>X</u>
b. Disruptions, displacements, compaction or overcovering of the soil?	___	___	<u>X</u>
c. Change in topography or ground surface relief features?	___	___	<u>X</u>
d. The destruction, covering or modification of any unique geologic or physical features?	___	___	<u>X</u>

	<u>Yes</u>	<u>Maybe</u>	<u>No</u>
e. Any increase in wind or water erosion of soils, either on or off the site?	___	___	<u>X</u>
f. Changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake?	___	___	<u>X</u>
g. Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards?	___	___	<u>X</u>
2. Air. Will the proposal result in:			
a. Substantial air emissions or deterioration of ambient air quality?	___	___	<u>X</u>
b. The creation of objectionable odors?	___	___	<u>X</u>
c. Alteration of air movement, moisture, or temperature, or any change in climate, either locally or regionally?	___	___	<u>X</u>
3. Water. Will the proposal result in:			
a. Changes in currents, or the course of direction of water movements, in either marine or fresh waters?	___	___	<u>X</u>
b. Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?	___	___	<u>X</u>
c. Alterations to the course or flow of flood waters?	___	___	<u>X</u>
d. Change in the amount of surface water in any water body?	___	<u>X</u>	___
e. Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?	<u>X</u>	___	___

	<u>Yes</u>	<u>Maybe</u>	<u>No</u>
f. Alteration of the direction or rate of flow of ground waters?	___	<u>X</u>	___
g. Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	___	<u>X</u>	___
h. Substantial reduction in the amount of water otherwise available for public water supplies?	___	___	<u>X</u>
i. Exposure of people or property to water related hazards such as flooding or tidal waves?	___	___	<u>X</u>
4. Plant Life. Will the proposal result in:			
a. Change in the diversity of species, or number of any species of plants (including trees, shrubs, grass, crops, and aquatic plants)?	___	___	<u>X</u>
b. Reduction of the numbers of any unique, rare or endangered species of plants?	___	___	<u>X</u>
c. Introduction of new species of plants into an area, or in a barrier to the normal replenishment of existing species?	___	___	<u>X</u>
d. Reduction in acreage of any agricultural crop?	___	<u>X</u>	___
5. Animal Life. Will the proposal result in:			
a. Change in the diversity of species, or numbers of any species of animals (birds, land animals including reptiles, fish and shellfish, benthic organisms or insects)?	___	___	<u>X</u>
b. Reduction of the numbers of any unique, rare or endangered species of animals?	___	___	<u>X</u>
c. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?	___	___	<u>X</u>

	<u>Yes</u>	<u>Maybe</u>	<u>No</u>
d. Deterioration to existing fish or wildlife habitat?	___	___	<u>X</u>
6. Noise. Will the proposal result in:			
a. Increases in existing noise levels?	___	___	<u>X</u>
b. Exposure of people to severe noise levels?	___	___	<u>X</u>
7. Light and Glare. Will the proposal produce new light or glare?	___	___	<u>X</u>
8. Land Use. Will the proposal result in a substantial alteration of the present or planned land use of an area?	___	___	<u>X</u>
9. Natural Resources. Will the proposal result in:			
a. Increase in the rate of use of any natural resources?	___	___	<u>X</u>
b. Substantial depletion of any nonrenewable natural resource?	___	___	<u>X</u>
10. Risk of Upset. Will the proposal involve:			
a. A risk of an explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions?	___	___	<u>X</u>
b. Possible interference with an emergency response plan or an emergency evacuation plan?	___	___	<u>X</u>
11. Population. Will the proposal alter the location, distribution, density, or growth rate of the human population of an area?	___	___	<u>X</u>
12. Housing. Will the proposal affect existing housing, or create a demand for additional housing?	___	___	<u>X</u>
13. Transportation/Circulation. Will the proposal result in:			

	<u>Yes</u>	<u>Maybe</u>	<u>No</u>
a. Generation of substantial additional vehicular movement?	___	___	<u>X</u>
b. Effects on existing parking facilities, or demand for new parking?	___	___	<u>X</u>
c. Substantial impact upon existing transportation systems?	___	___	<u>X</u>
d. Alterations to present patterns of circulation or movement of people and/or goods?	___	___	<u>X</u>
e. Alterations to waterborne, rail or air traffic?	___	___	<u>X</u>
f. Increase in traffic hazards to motor vehicles, bicyclists or pedestrians?	___	___	<u>X</u>
14. Public Services. Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:			
a. Fire protection?	___	___	<u>X</u>
b. Police protection?	___	___	<u>X</u>
c. Schools?	___	___	<u>X</u>
d. Parks or other recreational facilities?	___	___	<u>X</u>
e. Maintenance of public facilities, including roads?	___	___	<u>X</u>
f. Other governmental services?	___	___	<u>X</u>
15. Energy. Will the proposal result in:			
a. Use of substantial amounts of fuel or energy?	___	___	<u>X</u>
b. Substantial increase in demand upon existing sources of energy, or require the development of new sources energy?	___	___	<u>X</u>

	<u>Yes</u>	<u>Maybe</u>	<u>No</u>
16. Utilities. Will the proposal result in a need for new systems, or substantial alterations to the following utilities:			
a. Power or natural gas?	___	___	<u>X</u>
b. Communications systems?	___	___	<u>X</u>
c. Water?	___	___	<u>X</u>
d. Sewer or septic tanks?	___	___	<u>X</u>
e. Storm water drainage?	___	___	<u>X</u>
f. Solid waste and disposal?	___	___	<u>X</u>
17. Human Health. Will the proposal result in:			
a. Creation of any health hazard or potential health hazard (excluding mental health)?	___	___	<u>X</u>
b. Exposure of people to potential health hazards?	___	___	<u>X</u>
18. Aesthetics. Will the proposal result in the obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to public view?	___	___	<u>X</u>
19. Recreation. Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities?	___	___	<u>X</u>
20. Cultural Resources.			
a. Will the proposal result in the alteration of or the destruction of a prehistoric or historic archaeological site?	___	___	<u>X</u>
b. Will the proposal result in adverse physical or aesthetic effects to a prehistoric or historic building, structure, or object?	___	___	<u>X</u>
c. Does the proposal have the potential to cause a physical change which would affect unique ethnic cultural values?	___	___	<u>X</u>

	<u>Yes</u>	<u>Maybe</u>	<u>No</u>
d. Will the proposal restrict existing religious or sacred uses within the potential impact area?	___	___	<u>X</u>

21. Mandatory Findings of Significance.

a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	___	___	<u>X</u>
b. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)	___	___	<u>X</u>
c. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)	___	___	<u>X</u>
d. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	___	___	<u>X</u>

III. Discussion of Environmental Evaluation

This section presents an explanation for those items check "Maybe" or "Yes" in the previous section. The item number of the previous section is used to identify the explanation.

3.d. The amendment of the Basin Plan to control agricultural subsurface drainage discharges may result in alteration of the volume of flow in Mud Slough (north), Salt Slough or the San Joaquin River. The amount of flow in Mud Slough (north) or Salt Slough could increase or decrease, and the amount of flow in the San Joaquin River could decrease depending upon the actions taken by dischargers in complying with the amendments to the Basin Plan. If alteration in the volume of flow in the San Joaquin River does occur, it will likely be small in the reach, mouth of the Merced River to Vernalis. Larger alterations in volume of flow may occur in Mud Slough (north), Salt Slough and the San Joaquin River mouth of Salt Slough to mouth of the Merced River. However, in both instances, the environmental effects will not be significant.

Actions taken by dischargers to reduce the amount of agricultural subsurface drainage pollutants in the San Joaquin River, Mud Slough (north) and Salt Slough 1) may reduce the volume of drainage discharged and thus the volume in these channels, 2) may move drainage discharges from either Mud Slough (north) or Salt Slough to the other, and 3) may move drainage discharges out of both sloughs and into another channel. The rate of flow in these sloughs and short reach of the river changes dramatically over a year. The changes in rate of flow that may happen as a result of adoption of the proposed basin plan amendments will likely not cause flow rates outside of the range that occurs presently.

3.e. The amendment of the Basin Plan to control agricultural subsurface drainage discharges will lead to an improvement in water quality. The achievement of water quality objectives in Mud Slough (north), Salt Slough, and the San Joaquin River will improve water quality in these surface water bodies by reducing levels of selenium and boron. In addition, many of the potential actions that dischargers could take to reduce selenium and boron levels may also reduce the levels of salinity and other trace elements. While there will be a change in surface water quality, the change will be an improvement in water quality.

3.f. and g. The amendment of the Basin Plan to control agricultural subsurface drainage discharges may lead to a decrease in the amount of deep percolation reaching the ground water and possibly a lowering of ground water elevation. Several of the potential control actions dischargers may use to reduce the volume of agricultural subsurface drainage produced involve water conservation, i.e., the reduction in the amount of agricultural water applied to fields or lost as seepage from water supply facilities. Water conservation measures will reduce the amount of water leaked into the soil from ditches and canals, and the amount of applied irrigation water passing out of the bottom of the crop root zone. Water conservation will result in a reduction in the amount of water reaching the ground water and possibly a reduction in ground water elevations.

However, any impacts on the ground water will not be significant. The impacts on ground water elevation will likely be less than two feet out of several hundred feet of ground water. Any reduction in volume of ground water recharge will be even smaller. The objective of the water conservation measures will be the reduction in flows at agricultural drainage facilities. Thus, the net loss of ground water recharge will be small due to the offsetting reduction in ground water picked up by subsurface drainage facilities.

4.d. The amendment of the Basin Plan to control agricultural drainage discharges may cause some changes in the types of crops grown on some lands. Some agricultural subsurface drainage control options and/or the economic impact of achieving the water quality objectives may cause some lands, that produce agricultural subsurface drainage, to change the type of crop grown. Based on the economic analysis in the Technical Committee Report (SWRCB, 1987), the amount of land likely to change type of crops due to the economic impact of achieving the water quality objectives appears to be small and the amount of land that goes out of production very small or none at all. Additionally, the recycling or reuse of agricultural subsurface drainage may preclude the growing of certain salt sensitive crops. However, the acreage is likely to be very small. While the control of agricultural subsurface discharges may cause some changes in the types of crops grown on those areas that generate subsurface drainage and may cause some land to go out of production, neither the area in which crop type changes nor the area that ceases production will be significant in comparison to the area that generates agricultural subsurface drainage.

PROPOSED ACTIVITY

The Regional Board will consider amending the Water Quality Control Plan (Basin Plan) for the San Joaquin Basin (5C). The Regional Board will consider modifying designated beneficial uses, adding water quality objectives and adding a program of implementation to control discharges to the San Joaquin River and its tributaries.

In July 1975, the Regional Board adopted the present Basin Plan for the San Joaquin Basin. The Basin Plan identifies existing and potential beneficial uses, contains water quality objectives to reasonably protect those beneficial uses and also contains a program of implementation. In February 1985, the SWRCB adopted Order WQ 85-1 instructing the Regional Board to adopt appropriate basin plan amendments and implement a program to control agricultural drainage discharges in the San Joaquin Basin.

The purpose of amending the Basin Plan is to ensure that the beneficial uses of surface water bodies impacted by the discharges of agricultural subsurface drainage are identified, to ensure that water quality objectives necessary for the reasonable protection of beneficial uses are established and to provide the basis for the program to control agricultural subsurface drainage discharges. The amendments to the Basin Plan under consideration consist of: 1) the identification of two tributaries (Mud Slough (north) and Salt Slough) of the San Joaquin River not previously expressly identified; 2) identification of the beneficial uses of those tributaries; 3) water quality objectives for selenium, molybdenum and boron for Mud Slough (north), Salt Slough and the San Joaquin River, Sack Dam to Vernalis; 4) Board policies related to the control of agricultural subsurface drainage discharges; and 5) a program of implementation. The program of implementation consists of a list of potential control actions, a schedule, a list of monitoring and surveillance activities, an estimate of the total cost of the program of implementation, and a list of potential funding sources.

The areas in the San Joaquin Basin that would principally be impacted by the adoption of the proposed basin plan amendments consist of western Fresno and Merced Counties and the San Joaquin River riparian zone from the mouth of Salt Slough downstream. The area that produces the agricultural subsurface drainage containing the highest levels of toxic trace elements and contributing the great majority of pollutant load to the San Joaquin River is located in western Fresno and Merced Counties. The two sloughs (Mud Slough (north) and Salt Slough) that receive essentially all subsurface drainage discharges from western Fresno and Merced Counties are located in western Merced County. Finally, the San Joaquin River, starting at the mouth of Salt Slough, is the recipient of these subsurface drainage discharges.

DETERMINATION

Based upon the Environmental Checklist and additional review, the Regional Board concludes that if adopted, the proposed amendments to the San Joaquin Basin Plan would not have any significant or potentially significant effects on the environment, and therefore, no alternatives or mitigation measures are proposed to avoid or reduce any significant effects on the environment.

REFERENCES

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4. Pratt, Parker, et. al, 1988. "Trace Element Guidelines for Irrigation Waters in the San Joaquin Valley", Department of Soil and Environmental Sciences, University of California, Riverside, for the State Water Resources Control Board.
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8. Regional Water Quality Control Board, Central Valley Region, August 1988d. "Staff Report on the Program of Implementation to Control Agricultural Subsurface Drainage Discharges in the San Joaquin Basin (5C)", Sacramento, California.
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12. University of California Committee of Consultants on Drainage Water Reduction, January 1988(b). "Associated Costs of Drainage Water Reduction", University of California, Davis.
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